**THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

TQ DELTA, LLC, 　　Plaintiff, v. COMMSCOPE HOLDING COMPANY, INC., COMMSCOPE INC., ARRIS INTERNATIONAL LIMITED, ARRIS GLOBAL LTD., ARRIS US HOLDINGS INC., ARRIS SOLUTIONS, INC., ARRIS TECHNOLOGY, INC., and ARRIS ENTERPRISES, LLC, 　　Defendants.	§ § § § § § § § § § § § § § §	CASE NO. 2:21-CV-310-JRG 　　(Lead Case)
TQ DELTA, LLC, 　　Plaintiff, v. NOKIA CORP., NOKIA SOLUTIONS AND NETWORKS OY, and NOKIA OF AMERICA CORP., 　　Defendants.	§ § § § § § § § § § §	CASE NO. 2:21-CV-309-JRG

CLAIM CONSTRUCTION
MEMORANDUM AND ORDER

Before the Court is the Opening Claim Construction Brief (Dkt. No. 107) filed by

Plaintiff TQ Delta, LLC ("Plaintiff" or "TQ Delta"). Also before the Court are the Responsive

Claim Construction Brief (Dkt. No. 135) filed by Defendants CommScope Holding Company,

Inc., CommScope Inc., ARRIS US Holdings, Inc., ARRIS Solutions, Inc., ARRIS Technology

(collectively, "CommScope Defendants"), Nokia of America Corp., Nokia Corp., and Nokia

Solutions and Networks Oy (collectively, "Nokia Defendants") (all, collectively, "Defendants"),

Plaintiff's reply (Dkt. No. 140), and Defendants' supplemental brief (Dkt. No. 157).

The Court held a hearing on June 1, 2022.

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I. BACKGROUND

Plaintiff submits that "[t]his case generally relates to communications technology for DSL-based systems." (Dkt. No. 124, at 1.)

Plaintiff alleges infringement of United States Patents No. 7,453,881 ("the '881 Patent"), 7,570,686 ("the '686 Patent"), 7,844,882 ("the '882 Patent"), 8,090,008 ("the '008 Patent"), 8,276,048 ("the '048 Patent"), 8,462,835 ("the '835 Patent"), 8,468,411 ("the '411 Patent"), 8,495,473 ("the '5473 Patent"), 8,594,162 ("the '162 Patent"), 8,595,577 ("the '577 Patent"), 8,937,988 ("the '988 Patent"), 9,014,193 ("the '193 Patent"), 9,094,348 ("the '348 Patent"), 9,154,354 ("the '354 Patent"), 9,300,601 ("the '601 Patent"), 9,485,055 ("the '055 Patent"), 9,547,608 ("the '608 Patent"), 9,894,014 ("the '014 Patent"), 10,044,473 ("the '4473 Patent"), 10,409,510 ("the '510 Patent"), 10,567,112 ("the '112 Patent"), and 10,833,809 ("the '809 Patent") (collectively, "the patents-in-suit").

As for the patents that are at issue in these claim construction proceedings, Defendants submit that "the parties refer to the [patent] families by the nomenclature used in the co-pending Delaware Cases that TQ Delta has filed against other defendants: Families 1, 2, 3, 4, 6, 9, and 10," and the parties submit that the disputed terms in these patents have been construed by the District of Delaware, such as in the rulings cited in the following chart:

Name of Group of Patents	Patents	Prior Claim Construction
"Family 1 Patents"	'686 Patent	*TQ Delta, LLC v. 2Wire, Inc.*, No. 1:13-CV-01835, Dkt. No. 477 (D. Del. Jan. 30, 2018) (Pl. Ex. 20) (Defs. Ex. 35) ("*Delaware Family 1 CC Opinion*")

"Family 2 Patents"	'881 Patent '193 Patent '601 Patent '014 Patent	*TQ Delta, LLC, v. 2Wire, Inc.*, No. 1:13-CV-01835, Dkt. No. 486 (D. Del. Feb. 7, 2018) (Pl. Ex. 21) (Defs. Ex. 30) ("*Delaware Family 2 CC Opinion*") *TQ Delta, LLC v. 2Wire, Inc.*, 373 F. Supp. 3d 509, 523–24 (D. Del. 2019) ("*Delaware Family 2 SJ Opinion*")
"Family 3 Patents"	'5473 Patent '882 Patent '608 Patent '510 Patent '048 Patent	*TQ Delta, LLC v. 2Wire, Inc.*, 1:13-CV-01835-RGA, et al., Dkt. No. 445 (D. Del. Dec. 18, 2017) (Pl. Ex. 23) ("*Delaware Family 3 CC Opinion*")
"Family 4 Patents"	'008 Patent	*TQ Delta, LLC v. 2Wire, Inc.*, No. 1:13-CV-01835, Dkt. No. 473 (D. Del. Jan. 29, 2018) (Pl. Ex. 25) (Defs. Ex. 32) ("*Delaware Family 4 CC Opinion*")
"Family 6 Patents"	'835 Patent '112 Patent '162 Patent	*TQ Delta, LLC, v. 2Wire, Inc.*, No. 1:13-CV-01835, Dkt. No. 447 (D. Del. July 3, 2018) (Defs. Ex. 29) ("*Delaware Family 6 CC Opinion*") *TQ Delta, LLC v. 2Wire, Inc.*, No. 1:13-CV-01835, Dkt. No. 540 (D. Del. July 24, 2018) (Defs. Ex. 36) ("*Delaware Family 6 CC Order*") *TQ Delta, LLC v. ADTRAN, Inc.*, No. 1:14-CV-00954-RGA, Dkt. No. 1377 (D. Del. Mar. 1, 2022). *TQ Delta, LLC v. 2Wire, Inc.*, No. 1:13-CV-01835, Dkt. No. 1567 (D. Del. June 28, 2021) ("*Delaware Family 6 SJ Opinion*")
"Family 9 Patents"	'055 Patent '348 Patent '809 Patent '577 Patent '411 Patent '4473 Patent	*TQ Delta, LLC v. Zyxel Commc'ns, Inc.*, No. 1:13-CV-02013, et al., Dkt. No. 521 (D. Del. May 8, 2018) (Pl. Ex. 24) ("*Delaware Family 9 CC Opinion*")

"Family 10 Patents"	'354 Patent '988 Patent	*TQ Delta, LLC v. ADTRAN, Inc.*, No. 1:14-CV-00954-RGA, Dkt. No. 375 (D. Del. Apr. 27, 2018) (as to related patent)

II. LEGAL PRINCIPLES

It is understood that "[a] claim in a patent provides the metes and bounds of the right which the patent confers on the patentee to exclude others from making, using or selling the protected invention." *Burke, Inc. v. Bruno Indep. Living Aids, Inc.*, 183 F.3d 1334, 1340 (Fed. Cir. 1999). Claim construction is clearly an issue of law for the court to decide. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 970–71 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996).

"In some cases, however, the district court will need to look beyond the patent's intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period." *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015) (citation omitted). "In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the 'evidentiary underpinnings' of claim construction that we discussed in *Markman*, and this subsidiary factfinding must be reviewed for clear error on appeal." *Id.* (citing 517 U.S. 370).

To ascertain the meaning of claims, courts look to three primary sources: the claims, the specification, and the prosecution history. *Markman*, 52 F.3d at 979. The specification must contain a written description of the invention that enables one of ordinary skill in the art to make and use the invention. *Id.* A patent's claims must be read in view of the specification, of which they are a part. *Id.* For claim construction purposes, the description may act as a sort of dictionary, which explains the invention and may define terms used in the claims. *Id.* "One

purpose for examining the specification is to determine if the patentee has limited the scope of the claims." *Watts v. XL Sys., Inc.*, 232 F.3d 877, 882 (Fed. Cir. 2000).

Nonetheless, it is the function of the claims, not the specification, to set forth the limits of the patentee's invention. Otherwise, there would be no need for claims. *SRI Int'l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1121 (Fed. Cir. 1985) (en banc). The patentee is free to be his own lexicographer, but any special definition given to a word must be clearly set forth in the specification. *Intellicall, Inc. v. Phonometrics, Inc.*, 952 F.2d 1384, 1388 (Fed. Cir. 1992). Although the specification may indicate that certain embodiments are preferred, particular embodiments appearing in the specification will not be read into the claims when the claim language is broader than the embodiments. *Electro Med. Sys., S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 1054 (Fed. Cir. 1994).

This Court's claim construction analysis is substantially guided by the Federal Circuit's decision in *Phillips v. AWH Corporation*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). In *Phillips*, the court set forth several guideposts that courts should follow when construing claims. In particular, the court reiterated that "the claims of a patent define the invention to which the patentee is entitled the right to exclude." *Id.* at 1312 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). To that end, the words used in a claim are generally given their ordinary and customary meaning. *Id.* The ordinary and customary meaning of a claim term "is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Id.* at 1313. This principle of patent law flows naturally from the recognition that inventors are usually persons who are skilled in the field of the invention and that patents are addressed to, and intended to be read by, others skilled in the particular art. *Id.*

Despite the importance of claim terms, *Phillips* made clear that "the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id.* Although the claims themselves may provide guidance as to the meaning of particular terms, those terms are part of "a fully integrated written instrument." *Id.* at 1315 (quoting *Markman*, 52 F.3d at 978). Thus, the *Phillips* court emphasized the specification as being the primary basis for construing the claims. *Id.* at 1314–17. As the Supreme Court stated long ago, "in case of doubt or ambiguity it is proper in all cases to refer back to the descriptive portions of the specification to aid in solving the doubt or in ascertaining the true intent and meaning of the language employed in the claims." *Bates v. Coe*, 98 U.S. 31, 38 (1878). In addressing the role of the specification, the *Phillips* court quoted with approval its earlier observations from *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998):

> Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim. The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction.

Phillips, 415 F.3d at 1316. Consequently, *Phillips* emphasized the important role the specification plays in the claim construction process.

The prosecution history also continues to play an important role in claim interpretation. Like the specification, the prosecution history helps to demonstrate how the inventor and the United States Patent and Trademark Office ("PTO") understood the patent. *Id.* at 1317. Because the file history, however, "represents an ongoing negotiation between the PTO and the applicant," it may lack the clarity of the specification and thus be less useful in claim

construction proceedings. *Id.* Nevertheless, the prosecution history is intrinsic evidence that is relevant to the determination of how the inventor understood the invention and whether the inventor limited the invention during prosecution by narrowing the scope of the claims. *Id.*; *see Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d 1340, 1350 (Fed. Cir. 2004) (noting that "a patentee's statements during prosecution, whether relied on by the examiner or not, are relevant to claim interpretation").

Phillips rejected any claim construction approach that sacrificed the intrinsic record in favor of extrinsic evidence, such as dictionary definitions or expert testimony. The *en banc* court condemned the suggestion made by *Texas Digital Systems, Inc. v. Telegenix, Inc.*, 308 F.3d 1193 (Fed. Cir. 2002), that a court should discern the ordinary meaning of the claim terms (through dictionaries or otherwise) before resorting to the specification for certain limited purposes. *Phillips*, 415 F.3d at 1319–24. According to *Phillips*, reliance on dictionary definitions at the expense of the specification had the effect of "focus[ing] the inquiry on the abstract meaning of words rather than on the meaning of claim terms within the context of the patent." *Id.* at 1321. *Phillips* emphasized that the patent system is based on the proposition that the claims cover only the invented subject matter. *Id.*

Phillips does not preclude all uses of dictionaries in claim construction proceedings. Instead, the court assigned dictionaries a role subordinate to the intrinsic record. In doing so, the court emphasized that claim construction issues are not resolved by any magic formula. The court did not impose any particular sequence of steps for a court to follow when it considers disputed claim language. *Id.* at 1323–25. Rather, *Phillips* held that a court must attach the appropriate weight to the intrinsic sources offered in support of a proposed claim construction, bearing in mind the general rule that the claims measure the scope of the patent grant.

The Supreme Court of the United States has "read [35 U.S.C.] § 112, ¶ 2 to require that a patent's claims, viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910, 134 S. Ct. 2120, 2129 (2014). "A determination of claim indefiniteness is a legal conclusion that is drawn from the court's performance of its duty as the construer of patent claims." *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1347 (Fed. Cir. 2005) (citations and internal quotation marks omitted), *abrogated on other grounds by Nautilus*, 572 U.S. 898. "Indefiniteness must be proven by clear and convincing evidence." *Sonix Tech. Co. v. Publ'ns Int'l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017).

"[P]rior orders in related cases do not bar the Court from conducting additional construction in order to refine earlier claim constructions." *TQP Dev., LLC v. Intuit Inc.*, No. 2:12-CV-180-WCB, 2014 WL 2810016, at *6 (E.D. Tex. June 20, 2014) (Bryson, J., sitting by designation).

In general, however, prior claim construction proceedings involving the same patents-in-suit are "entitled to reasoned deference under the broad principals of *stare decisis* and the goals articulated by the Supreme Court in *Markman*, even though *stare decisis* may not be applicable *per se*." *Maurice Mitchell Innovations, LP v. Intel Corp.*, No. 2:04-CV-450, 2006 WL 1751779, at *4 (E.D. Tex. June 21, 2006) (Davis, J.); *see TQP*, 2014 WL 2810016, at *6 ("[P]revious claim constructions in cases involving the same patent are entitled to substantial weight, and the Court has determined that it will not depart from those constructions absent a strong reason for doing so."); *see also Teva*, 135 S. Ct. at 839–40 ("prior cases will sometimes be binding because of issue preclusion and sometimes will serve as persuasive authority") (citation omitted); *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1329 (Fed. Cir. 2008) (noting "the importance of

uniformity in the treatment of a given patent") (quoting *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 390 (1996)).

III. AGREED TERMS

In their March 14, 2022 P.R. 4-3 Joint Claim Construction and Prehearing Statement, the parties submitted that "[t]he parties do not presently have agreed claim constructions." (Dkt. No. 107, at 2.)

IV. DISPUTED TERMS IN MULTIPLE PATENT FAMILIES

The term numbering used herein corresponds to the numbering used by Plaintiff in Exhibit A to the March 14, 2022 P.R. 4-3 Joint Claim Construction and Prehearing Statement. (Dkt. No. 107, Ex. A.)

1. **"transceiver"**

<table>
<tr><td colspan="2" align="center">

"transceiver"

'686 Patent, Claims 17, 36, 37
(Family 1)

'881 Patent, Claims 17, 18, 23
'193 Patent, Claims 1, 9
'601 Patent, Claims 8, 15
'014 Patent, Claims 1, 3
(Family 2)

'882 Patent, Claims 9, 13
'048 Patent, Claims 1, 5
'5473 Patent, Claims 10, 28
'608 Patent, Claim 2
'510 Patent, Claim 22
(Family 3)

'835 Patent, Claim 8
'112 Patent, Claims 8, 10
(Family 6)

'411 Patent, Claims 10, 18
'577 Patent, Claim 16
'348 Patent, Claims 1, 9
'055 Patent, Claims 11, 17
'809 Patent, Claims 4, 6, 8, 11, 13
(Family 9)

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Plaintiff's Proposed Construction

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Defendants' Proposed Construction

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<tr><td>

Plain and ordinary meaning, which is: "communications device capable of transmitting and receiving data wherein the transmitter portion and receiver portion share at least some common circuitry."

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Plain and ordinary meaning, which is "communications device capable of transmitting and receiving data"

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</table>

(Dkt. No. 107, Ex. A, at 1–2; *id.*, Ex. B, at 1; Dkt. No. 146, App'x A, at 2; Dkt. No. 149, App'x A, at 2, 4, 9 & 16.)

(a) The Parties' Positions

Plaintiff argues that "[o]ne of ordinary skill in the art would understand that a transceiver shares at least some common circuitry, as the Delaware Court concluded for this term." (Dkt. No. 124, at 2–3.)

Defendants respond that Plaintiff's proposal of requiring "common circuitry" lacks support in the intrinsic record, and Defendants argue that the Delaware construction is not binding and is inconsistent with this Court's construction of "transceiver" in another case. (Dkt. No. 135, at 3.)

Plaintiff replies: "The accepted meaning of 'transceiver'—which refers to a single device that can both transmit and receive—requires that the transmitter and receiver portions share common circuitry, as the Delaware Court found. Otherwise, it would not be a single device." (Dkt. No. 140, at 1.)

At the June 1, 2022 hearing, Plaintiff argued that "transceiver" is a portmanteau of "transmitter" and "receiver" and thus connotes something more specific than merely putting a transmitter and a receiver together. Defendants responded that the transmitter and the receiver within a transceiver *may* share circuitry, but not necessarily.

(b) Analysis

The District of Delaware noted that "[t]he specification does not provide an explicit definition of transceiver," found that "[e]valuating the intrinsic evidence in light of the dictionary definitions provided [by Plaintiff] suggests that a POSA would understand the transmitter and receiver portions to share common circuitry or components," and construed the term "transceiver" in these patents to mean "a communications device capable of transmitting and

receiving data wherein the transmitter portion and receiver portion share at least some common circuitry." *Delaware Family 1 CC Opinion* at 4–5 (citing *Phillips*, 415 F.3d at 1318).

Defendants do not persuasively justify departing from the Delaware construction. In particular, the dictionary definitions of "transceiver" cited by Plaintiff and considered by the District of Delaware are persuasive that a person of ordinary skill in the art would understand the term "transceiver" as referring not merely to a device that includes both a transmitter and a receiver but rather to a device in which a transmitter portion and a receiver portion share at least some common circuitry. (*See id.*; *see also* Dkt. No. 124, at 3; *id.*, Ex. 16, *Merriam Webster Dictionary* 1253 (10th ed. 1998) ("a radio transmitter-receiver that uses many of the same components for both transmission and reception"); *id.*, Ex. 17, *IEEE Standard Dictionary of Electrical and Electronics Terms* 1028 (1988) ("The combination of radio transmitting and receiving equipment in a common housing . . . and employing common circuit components for both transmitting and receiving."); *Delaware Family 1 CC Opinion* at 4; *TQ Delta, LLC v. 2Wire, Inc.*, No. 1:13-CV-01835 (D. Del.), Dkt. No. 342, Aug. 22, 2017 Joint Claim Construction Brief, at 24.) Defendants do not show any error in the consideration of this evidence by the District of Delaware. *See Phillips*, 415 F.3d at 1318 ("Because dictionaries, and especially technical dictionaries, endeavor to collect the accepted meanings of terms used in various fields of science and technology, those resources have been properly recognized as among the many tools that can assist the court in determining the meaning of particular terminology to those of skill in the art of the invention.") (citation omitted).

The specification disclosures cited by Defendants do not compel otherwise, as disclosure of a "transmitter section" and a "receiver section" is not inconsistent with "transceiver" being understood to connote at least some amount of overlap between "sections." (*See* Dkt. No. 135,

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at 2–3; *see also* '686 Patent at 2:1–5 ("Each modem includes a transmitter section for transmitting data and a receiver section for receiving data . . . .")).) Also, Plaintiff points out that the '882 Patent appears to contemplate overlap of circuitry, disclosing for example than "an exemplary transceiver could comprise a shared interleaver/deinterleaver memory." '882 Patent at 5:33–39.

Finally, Defendants cite this Court's construction of the term "transceiver" in different patents as meaning "a device that transmits and receives data." *Wi-LAN Inc. v. HTC Corp.*, No. 2:11-CV-68-JRG, Dkt. No. 302, slip op. at 8 (E.D. Tex. Apr. 11, 2013). That construction was agreed upon by the parties in that case (*see id.*), and Defendants show no indication that those parties had any dispute regarding whether the transmitter portion and receiver portion share at least some common circuitry. Defendants' reliance on *Wi-LAN* is therefore unpersuasive.

The Court accordingly hereby construes **"transceiver"** to mean **"a communications device capable of transmitting and receiving data wherein the transmitter portion and receiver portion share at least some common circuitry."**

2. "configurable to," "operable," and "operable to"

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"configurable to"
"operable"
"operable to"

'193 Patent, Claims 1, 9
'601 Patent, Claim 8
'014 Patent, Claim 1
(Family 2)

'608 Patent, Claim 2
'510 Patent, Claim 22
(Family 3)

'112 Patent, Claim 8
(Family 6)

'577 Patent, Claim 16
'348 Patent, Claims 1, 9
'055 Patent, Claim 11
(Family 9)

'354 Patent, Claim 10
'988 Patent, Claim 16
(Family 10)

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<tr><td>

Plaintiff's Proposed Construction

</td><td>

Defendants' Proposed Construction

</td></tr>
<tr><td>

Plain and ordinary meaning, which is: "able to be configured" / "capable" / "capable to"

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Plain and ordinary meaning, not mere capability

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</table>

(Dkt. No. 107, Ex. A, at 39–40; *id.*, Ex. B, at 5; Dkt. No. 146, App'x A, at 3; Dkt. No. 149, App'x A, at 24, 27, 28, 29 & 32.)

(a) The Parties' Positions

Plaintiff argues:

A plain reading of the claims indicates that the "operable to" / "configurable to" terms mean that the claimed transceivers must be capable of performing the recited claim elements. Defendants, through their negative limitation "not mere capability," attempt to read out functionality present in an accused transceiver but

> that may require operation or configuration of the transceiver. For example, in Family 2, bonded transceivers must be connected through wires. A transceiver that contains the capability to be bonded with another transceiver could satisfy the bonding elements although the transceivers are sold individually and are not bonded out of the box.

(Dkt. No. 124, at 4 (citations omitted).)

Defendants respond that the plain and ordinary meaning of "operable to" and "configurable to" does *not* encompass mere capability. (Dkt. No. 135, at 3.) In other words, Defendants argue that "[t]hese terms require structure that presently is 'operable to' or 'configurable to' perform the stated tasks, not merely capable of being *modified* to do so." (*Id.*, at 3–4.) Defendants also submit that their proposal is consistent with rulings by the District of Delaware as well as this Court's prior constructions of "operable to" in other cases. (*Id.*, at 4.)

Plaintiff replies that these terms refer to capabilities and, moreover, *even if* the claims recited "configur*ed* to," the structure need not be in operation in order to infringe because these are not method claims. (Dkt. No. 140, at 1.) Nonetheless, Plaintiff notes that "TQ Delta is also not proposing that the claims encompass mere capability to perform a function in the abstract, such as through re-writing code." (*Id.*, at 2.) Plaintiff urges that "Defendants' 'not mere capability' negative limitation is unhelpful and ambiguous to the jury." (*Id.*)

At the June 1, 2022 hearing, Plaintiff urged that all of these terms relate to capability, not actual operation. In response, Defendants stated that they will not argue that Plaintiff must prove that the accused devices are taken out of their packaging, plugged in, and turned on, but Defendants explained that they are arguing that the functionality must actually be built into the device. Defendants expressed concern that Plaintiff might accuse a functionality that is set forth in an industry standard and that Plaintiff might rely on a hypothetical possibility that such

functionality could have been built into an accused device (even if that functionality is absent in the actual accused device).

(b) Analysis

Claim 1 of the '193 Patent, for example, recites:

1. A device comprising:
   a plurality of transceivers *configurable to* simultaneously operate with a combination of bonded and unbonded transceivers, wherein a first transceiver of the plurality of transceivers is *operable* at a first data rate, and a second transceiver of the plurality of transceivers is simultaneously *operable* at a second data rate that is different than the first data rate, wherein the first and second transceivers are *operable* as bonded transceivers and wherein a third transceiver, of the plurality of transceivers, is simultaneously *operable* at a third data rate and the third transceiver is not bonded with any other transceiver.

As a general matter, the Court of Appeals for the Federal Circuit has noted that "configured to" is narrower than "capable of." *Aspex Eyewear, Inc. v. Marchon Eyewear, Inc.*, 672 F.3d 1335, 1349 (Fed. Cir. 2012). Also, the District of Delaware discussed "configurable" in the *Delaware Family 2 CC Opinion* at pages 8–11 (in the context of discussing the term "plurality of bonded transceivers"), such as that "'configurability,' in the context of the asserted claims, has a narrower meaning than 'capability.'" The District of Delaware further discussed "configurable to" in the *ADTRAN* case (as to a different patent held by Plaintiff), construing "configured to" and "configurable to" to mean "includes the necessary hardware and software for performing the functionality recited in the claim without the need to rebuild, rewrite or recompile the code for, or redesign any of that hardware or software." *See TQ Delta, LLC v. ADTRAN, Inc.*, No. 1:14-CV-00954-RGA, Dkt. No. 1319, slip op. at 8; *see id.* at 7–11 (D. Del. Mar. 30, 2021).

Particularly because the disputed term in the present case is not "configur*ed*" but rather is "configur*able*," Plaintiff's proposal of "able to be configured" is appropriate. Of note, in ruling

on motions for summary judgment regarding the '835 Patent, the District of Delaware cited the

ADTRAN decision (*id.*) and further stated: "As I explained in that case, 'configurable to' does

require that the source code required to implement the claimed functionality be present in the

invention, but the term does not require that the functionality be enabled in the invention's initial

configuration (i.e., as provided to a consumer)." *Delaware Family 6 SJ Opinion* at 7.   The

Court's own prior constructions of "configur*ed* to," cited here by Defendants, are of limited

persuasive value in construing the different term "configurable." (*See* Dkt. No. 135, at 4.) Also,

Plaintiff's proposal that "configurable" means "able to be configured" is consistent with the

meaning of "configurable" in common parlance, and Defendants have not shown that the

patentee used "configurable" according to any technical or specialized meaning. *See Phillips*,

415 F.3d at 1314 ("In some cases, the ordinary meaning of claim language as understood by a

person of skill in the art may be readily apparent even to lay judges, and claim construction in

such cases involves little more than the application of the widely accepted meaning of commonly

understood words.").

In sum, as to the dispute regarding the claim term "configurable to" in the present case,

Plaintiff's proposal of "able to be configured" is sufficiently clear and can be applied in the

context of a particular accused device. *See id.*; *see also Versata Software, Inc. v. SAP Am., Inc.*,

717 F.3d 1255, 1262 (Fed. Cir. 2013) ("[W]hen a user must activate the functions programmed

into a piece of software by selecting those options, the user is only activating the means that are

already present in the underlying software.") (citations and internal quotation marks omitted).

As to the terms "operable" and "operable to," however, the applicable principle is: "that a

device is *capable* of being modified to operate in an infringing manner is not sufficient, by itself,

to support a finding of infringement." *Telemac Cellular Corp. v. Topp Telecom, Inc.*, 247 F.3d

1316, 1330 (Fed. Cir. 2001) (emphasis added). Plaintiff's proposals of "capable" and "capable

to" are therefore potentially overbroad because "capable" might be interpreted broadly as

allowing for an ability that arises after modification. The *Iron Oak* and *e-Watch* cases cited by

Plaintiff did not address this issue. *See Iron Oak Techs., LLC v. Microsoft Corp.*, 857 F. App'x

644, 649 (Fed. Cir. May 24, 2021) (as to a term that recited "operable to create patched operating

code . . .," addressing a dispute regarding the timing of the operation); *see also e-Watch Inc. v.*

Apple, Inc., No. 2:13-CV-1061, 2015 WL 1387947, at *6 (E.D. Tex. Mar. 25, 2015) (in

addressing dispute regarding whether claims were improper mixed method-apparatus claims,

finding that claim language reciting "being operable to" showed that the "patentee understood

how to draft claim language that referred to the capabilities of an element"). Indeed, Plaintiff

acknowledges that it does not seek an interpretation that would encompass "mere capability to

perform a function in the abstract, such as through re-writing code." (Dkt. No. 140, at 2.)

Instead, the terms "operable" and "operable to" should be construed to refer to being

configured to operate in the recited manner. The District of Delaware reached a similar

conclusion in the *ADTRAN* case as to another patent held by Plaintiff. *See TQ Delta, LLC v.*

ADTRAN, Inc., No. 1:14-CV-00954-RGA, Dkt. No. 909, slip op. at 9 (D. Del. Oct. 31, 2019)

("I find that in view of the relevant cases, 'operable to' requires something more than 'capable

of.' I will give 'operable to' its plain and ordinary meaning, which is narrower than 'capable

of.'"); *see id.* at 7–9.

As to different claims of the '577 Patent that were at issue in *ADTRAN*, the District of

Delaware construed "operable to" to mean "in operation to":

> ADTRAN argues that the claim language "operable to" requires that the multicarrier transceiver actually operates "to receive at least one packet using deinterleaving, and transmit at least one message without using interleaving," and thus, that the claims recite actual operation. I agree.
>
> Thus, I will construe "operable to" to mean "in operation to."

Id., Dkt. No. 800, slip op. at 5–7 (D. Del. Sept. 10, 2019). This decision by the District of Delaware also rejected Plaintiff's argument that "operable to" should be construed to mean "capable of":

> It appears that the claims consistently use the term "operable to" when describing the "multicarrier transceiver" that is part of the claimed apparatus. (*See, e.g.*, '577 patent, cls. 53, 55). In contrast, the claims use "capable of" when defining the apparatus itself, i.e., "The apparatus of claim 53, wherein the apparatus is a linecard that is *capable* of transporting video, voice, and data." (*id.*, cl. 56; *see also, id.*, cls. 19–20, 26–27, 33–34, 40–41, 48–49, 56–57). The claims of the '784 patent do not use the term "capable of." (*See, e.g.*, '784 patent, cl. 7). The difference in usage indicates that the patentee intended for "operable to" and "capable of" to have different meanings. While the apparatus itself needs only to be capable of certain functionalities (transporting video, voice, and data), the transceiver needs to operate in a manner that performs the functions stated in the claim (transmit at least one packet using interleaving, and receive at least one message without using interleaving).

Id. at 6 (footnote omitted).   In this context, a fair reading of the District of Delaware's construction of claims in the '577 Patent is that in construing "operable to" to mean "in operation to," the District of Delaware distinguished mere capability and instead required actual configuration to operate in the recited manner. At the June 1, 2022 hearing, Plaintiff argued that the District of Delaware erred by requiring "operation," but when this construction by the District of Delaware is read in the context of the court's analysis distinguishing mere capability, "in operation to" does not appear to require actively operating but rather refers to what occurs when in operation.

That is, "oper*able*" (or "opera*tion*"), at least in the context of the patents here at issue, is *not* tantamount to operat*ing*. At the June 1, 2022 hearing, Defendants stated that they will not

argue that Plaintiff must prove that the accused devices are taken out of their packaging, plugged in, and turned on. The Court finds this interpretation to be appropriate, and this finding is also consistent with decisions of the Federal Circuit. *See, e.g., Finjan, Inc. v. Secure Computing Corp.*, 626 F.3d 1197, 1203–05 (Fed. Cir. 2010) ("it is undisputed that software for performing the claimed functions existed in the products when sold—in the same way that an automobile engine for propulsion exists in a car even when the car is turned off"); *Fantasy Sports Props. v. Sportsline.com, Inc.*, 287 F.3d 1108, 1118 (Fed. Cir. 2002) ("[A]lthough a user must activate the functions programmed into a piece of software by selecting those options, the user is only activating means that are *already present in the underlying software*.").

Any remaining dispute, such as whether or not particular accused transceivers are "operable as bonded transceivers" (*see, e.g.,* '193 Patent, Cl. 1 (reproduced above)), relates to factual issues regarding infringement rather than any legal question for claim construction. *See PPG Indus. v. Guardian Indus. Corp.*, 156 F.3d 1351, 1355 (Fed. Cir. 1998) ("after the court has defined the claim with whatever specificity and precision is warranted by the language of the claim and the evidence bearing on the proper construction, the task of determining whether the construed claim reads on the accused product is for the finder of fact"); *see also Acumed LLC v. Stryker Corp.*, 483 F.3d 800, 806 (Fed. Cir. 2007) ("[t]he resolution of some line-drawing problems . . . is properly left to the trier of fact") (citing *PPG*, 156 F.3d at 1355); *Eon Corp. IP Holdings LLC v. Silver Spring Networks, Inc.*, 815 F.3d 1314, 1318–19 (Fed. Cir. 2016) (citing *PPG*, 156 F.3d at 1355; citing *Acumed*, 483 F.3d at 806).

For example, "when 'a user must activate the functions programmed into a piece of software by selecting those options, the user is only activating the means that are already present in the underlying software.'" *Versata Software, Inc. v. SAP Am., Inc.*, 717 F.3d 1255, 1262 (Fed.

Cir. 2013). At the June 1, 2022 hearing, Plaintiff agreed that the scope of this type of activation, in the context of Plaintiff's proposal of "able to be configured," would not include rebuilding source code or redesigning integrated circuit chips. The Court understands this to be merely an illustrative list of examples, so the Court does not include this list in the Court's construction, but the Court expressly relies on these statements by Plaintiff at the June 1, 2022 hearing regarding Plaintiff's understanding of "configured" and "able to be configured."

The Court therefore hereby construes these disputed terms as set forth in the following chart:

Term	Construction
"configurable to"	**"able to be configured"**
"operable"	**"configured"**
"operable to"	**"configured to"**

V. DISPUTED TERMS IN THE "FAMILY 1" PATENTS

Plaintiff submits that "[t]he Family 1 Patents relate to communicating certain specified test and/or diagnostic information about the communication channel over which the multicarrier transceiver communicates." (Dkt. No. 124, at 1 (citation omitted).)

The '686 Patent, titled "Systems and Methods for Establishing a Diagnostic Transmission Mode and Communicating Over the Same," issued on August 4, 2009, and bears an earliest priority date of January 7, 2000.

The Abstract of the '686 Patent states:

Upon detection of a trigger, such as the exceeding of an error threshold or the direction of a user, a diagnostic link system enters a diagnostic information transmission mode. This diagnostic information transmission mode allows for two modems to exchange diagnostic and/or test information that may not otherwise be exchangeable during normal communication. The diagnostic

information transmission mode is initiated by transmitting an initiate diagnostic link mode message to a receiving modem accompanied by a cyclic redundancy check (CRC). The receiving modem determines, based on the CRC, if a robust communications channel is present. If a robust communications channel is present, the two modems can initiate exchange of the diagnostic and/or test information. Otherwise, the transmission power of the transmitting modem is increased and the initiate diagnostic link mode message re-transmitted to the receiving modem until the CRC is determined to be correct.

3. "each bit in the diagnostic message is mapped to at least one DMT symbol," "DMT symbols that are mapped to one bit of the diagnostic message," and "at least one bit in the diagnostic message is mapped to at least one DMT symbol"

"each bit in the diagnostic message is mapped to at least one DMT symbol" '686 Patent, Claim 17	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
"each bit in the diagnostic message is communicated using a modulation scheme where a DMT symbol (or two or more DMT symbols) represents only a single bit of the diagnostic message"	Indefinite

"DMT symbols that are mapped to one bit of the diagnostic message" '686 Patent, Claim 36	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
"at least one bit in the diagnostic message is communicated using a modulation scheme where two or more DMT symbols represent only the same single bit of the diagnostic message"	Indefinite

"at least one bit in the diagnostic message is mapped to at least one DMT symbol" '686 Patent, Claim 40	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
"at least one bit in the diagnostic message is communicated using a modulation scheme where a DMT symbol (or two or more DMT symbols) represents only a single bit of the diagnostic message"	Indefinite

(Dkt. No. 107, Ex. A, at 55; *id.*, Ex. B, at 3; *see* Dkt. No. 146, App'x A, at 3–4; Dkt. No. 149, App'x A, at 34.)

As to "at least one bit in the diagnostic message is mapped to at least one DMT symbol" in Claim 40 of the '686 Patent, this term does not appear in the parties' P.R. 4-5(d) Joint Claim Construction Chart, so Plaintiff evidently no longer asserts the claim in which this term appears. (*See id.*) The Court therefore does not further address this term.

(a) The Parties' Positions

Plaintiff argues that "TQ Delta proposes the construction adopted by the Delaware Court (which also rejected a definiteness challenge)," and "[t]hose in the art understand that 'each bit in the diagnostic message is mapped to at least one DMT symbol' refers to a more robust form of communication utilized in the presence of 'noise' to ensure more reliable communication of the diagnostic message." (Dkt. No. 124, at 5 (citation omitted).) Plaintiff also argues, for example, that "[t]he fact that the claims cover various scenarios or that a mapping function would need to be defined does not render them indefinite." (*Id.*, at 6 (citation omitted).)

Defendants respond that "this language is subject to any number of interpretations, resulting in confusion as to what is intended," and "the specification confirms the ambiguity of the term." (Dkt. No. 135, at 5–6 (citation omitted).) For example, Defendants argue that "the

language of the patent itself raises a number of questions in the mind of a POSITA, such as (1) whether there is some error coding used to map a bit into several redundant symbols, (2) whether the same bit is sent multiple times, once in each symbol, or (3) whether the claim language contemplates something else entirely." (*Id.*, at 6 (citation omitted).)

Plaintiff replies by reiterating that the potential for needing a mapping function does not render these claims indefinite. (Dkt. No. 140, at 2.) Also, Plaintiff submits that it is reasonably clear how one bit could be mapped to more than one symbol because "a single bit could be repeated in the next symbol." (*Id.*, at 3.)

At the June 1, 2022 hearing, in response to inquiry by the Court, Plaintiff stated that construing these terms to have their plain meaning would be sufficient if the Court rejects Defendants' indefiniteness argument.

(b) Analysis

The District of Delaware rejected an indefiniteness challenge as to the term "each bit in the diagnostic message is mapped to at least one DMT signal" in Claim 5 of the '686 Patent and construed the term to mean "each bit in the diagnostic message is mapped to either (1) one signal resulting from DMT modulation or (2) more than one signal resulting from DMT modulation." *Delaware Family 1 CC Opinion* at 14–17.

The specification discloses, for example:

In the diagnostic link mode, the RT modem sends diagnostic and test information in the form of a collection of information bits to the CO modem that are, for example, modulated by *using one bit per DTM* [*sic*, DMT] *symbol* modulation, as is used in the C-Rates1 message in the ITU and ANSI ADSL standards, where the symbol may or may not include a cyclic prefix. . . .

In the one bit per DMT symbol modulation message encoding scheme, a bit with value 0 is *mapped* to the REVERB1 signal and a bit with a value of 1 *mapped* to a SEGUE1 signal.

'686 Patent at 3:44–57 (emphasis added).

Defendants argue that this disclosure uses "mapped" in relation to a "signal" rather than a "symbol," but this appears as part of a discussion of modulating bits using "one bit per DMT *symbol* modulation" and thus on its face is relevant to determining whether a person of ordinary skill in the art would understand the word "mapped" in the context of the patent and the terms here at issue. (*Id.* (emphasis added).)

Also, Defendants submit the opinion of their expert that "mapped" is unclear and "could mean that the same bit value is represented by one symbol, two symbols, or every symbol that results from a given DMT signal," and "[a] person of skill in the art would understand that you have to define a mapping function with specificity in order to implement that particular function." (Dkt. No. 135, Ex. 23, Mar. 14, 2022 McNair Decl., at ¶ 46.)

On balance, Defendants do *not* persuasively show that a potential need for a "mapping function" renders the claim unclear. Defendants' expert opines that a person of ordinary skill would not know how to map a bit of data in accordance with these claims (*see id.* at ¶ 50–54), but while this argument perhaps might bear upon the enablement and written description requirements, Defendants' arguments in this regard do not demonstrate any lack of reasonable certainty as to the scope of these claims.

Defendants thus do not meet their burden to show any lack of reasonable certainty as to the scope of these terms. *See Nautilus*, 572 U.S. at 910; *see also Sonix*, 844 F.3d at 1377. Defendants do not present any alternative proposed constructions. Although Plaintiff has proposed constructions, no further construction is necessary, as Plaintiff agreed at the June 1, 2022 hearing, and indeed the District of Delaware included the word "mapped" in its construction. *Delaware Family 1 CC Opinion* at 14. The Court having rejected Defendants'

indefiniteness argument, and in the absence of any alternative proposed constructions from Defendants, no further construction of these disputed terms is necessary. *See U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997) ("Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in redundancy."); *see also O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008) ("[D]istrict courts are not (and should not be) required to construe every limitation present in a patent's asserted claims."); *Finjan, Inc. v. Secure Computing Corp.*, 626 F.3d 1197, 1207 (Fed. Cir. 2010) ("Unlike *O2 Micro*, where the court failed to resolve the parties' quarrel, the district court rejected Defendants' construction."); *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1326 (Fed. Cir. 2012); *Summit 6, LLC v. Samsung Elecs. Co., Ltd.*, 802 F.3d 1283, 1291 (Fed. Cir. 2015); *Bayer Healthcare LLC v. Baxalta Inc.*, 989 F.3d 964, 977–79 (Fed. Cir. 2021).

The Court therefore hereby construes **"each bit in the diagnostic message is mapped to at least one DMT symbol"** and **"DMT symbols that are mapped to one bit of the diagnostic message"** to have their **plain meaning**.

4. "array representing frequency domain received idle channel noise information"

"array representing frequency domain received idle channel noise information" '686 Patent, Claims 17, 36	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
"ordered set of values representative of noise in the frequency domain that was received by a transceiver on respective subchannels in the absence of a transmission signal on the received channel"	"array of values representative of noise in the frequency domain that was received by a transceiver on respective subchannels in the absence of a transmission signal"

(Dkt. No. 107, Ex. A, at 57; *id.*, Ex. B, at 4; Dkt. No. 146, App'x A, at 3; Dkt. No. 149, App'x A, at 36.)

(a) The Parties' Positions

Plaintiff submits that "TQ Delta's proposed construction is the same construction adopted by the Delaware Court," and Plaintiff argues that "the specification makes clear that a complete absence of any transmission signal is not required." (Dkt. No. 124, at 7 (citation omitted).) As to Plaintiff's proposal that an "array" is an "ordered set of values," Plaintiff submits that "TQ Delta does not understand there to be a substantive dispute regarding the meaning of ['array'], and TQ Delta's plain-meaning construction will help the jury." (*Id.*)

Defendants respond that "'array' is a commonly accepted term of art and need not be further construed," "there is no record support for restricting the claimed 'array' to an 'ordered set' of values as TQ Delta proposes," and "TQ Delta's proposed addition of 'on the received channel' is contrary to the specification." (Dkt. No. 135, at 7 (citation omitted).)

Plaintiff replies that "the claim only requires that one channel is idle—the 'idle channel'—and is silent about what may or may not be transmitting on other channels." (Dkt. No. 140, at 3.) Plaintiff argues that "Defendants' construction improperly narrows the claim (to an impractical or impossible degree) by requiring a complete absence of transmission on *every* channel, not just the channel being measured." (*Id.*)

(b) Analysis

Claim 17 of the '686 Patent, for example, recites (emphasis added):

17. An information storage media comprising instructions that when executed communicate diagnostic information over a communication channel using multicarrier modulation comprising:
         instructions that when executed direct a transceiver to receive or transmit an initiate diagnostic mode message; and

instructions that when executed transmit a diagnostic message from the transceiver using multicarrier modulation, wherein the diagnostic message comprises a plurality of data variables representing the diagnostic information about the communication channel and each bit in the diagnostic message is mapped to at least one DMT symbol, and wherein one variable comprises an *array representing frequency domain received idle channel noise information*.

The District of Delaware construed this disputed term to mean "ordered set of values representative of noise in the frequency domain that was received by a transceiver on respective subchannels in the absence of a transmission signal on the received channel." *Delaware Family 1 CC Opinion* at 7–9.

First, the parties dispute whether the constituent term "array" should be included in the construction or should instead be construed to mean "ordered set of values." The specification uses the word "array" without elaboration. *See* '686 Patent at 4:38–42 ("Many variables that represent the type of diagnostic and test information that are used to analyze the condition of the link are sent from the RT [(remote terminal)] modem to the CO [(central office)] modem. These variables can be, for example, *arrays* with different lengths depending on, for example, information in the initiate diagnostic mode message.") (emphasis added).

The District of Delaware included the phrase "ordered set of values" in its construction of the present term in the '686 Patent, both sides in that case having included that phrase in their proposed constructions. *See Delaware Family 1 CC Opinion* at 7. Plaintiff does not persuasively justify departing from that interpretation of "array" as meaning "ordered set of values," particularly in light of Plaintiff having proposed that phrase in the District of Delaware. *See id.* This will help make clear than an "array" is not merely a collection of information.

As to whether the construction should refer to an absence of a transmission signal "on the received channel," the disputed term itself refers to an "idle channel," which weighs against Defendants' proposal of requiring total absence of *any* transmission signal on *any* channel. The

Background of the Invention section of the specification is consistent with this understanding,

referring to a "channel," "subchannels," and also potential "disturbances from other data

services":

> The exchange of diagnostic and test information between transceivers in a telecommunications environment is an important part of a telecommunications, such as an ADSL, deployment. In cases where the transceiver connection is not performing as expected, for example, where the data rate is low, where there are many bit errors, or the like, it is necessary to collect diagnostic and test information from the remote transceiver. This is performed by dispatching a technician to the remote site, e.g., a truck roll, which is time consuming and expensive.

> In DSL technology, communications over a local subscriber loop between a central office and a subscriber premises is accomplished by modulating the data to be transmitted onto a multiplicity of discrete frequency carriers which are summed together and then transmitted over the subscriber loop. Individually, the carriers form discrete, non-overlapping communication *subchannels* of limited bandwidth.   Collectively, the carriers form what is effectively a broadband communications *channel*. At the receiver end, the carriers are demodulated and the data recovered.

> DSL systems experience *disturbances from other data services* on adjacent phone lines, such as, for example, ADSL, HDSL, ISDN, T1, or the like.   These disturbances may commence after the subject ADSL service is already initiated and, since DSL for internet access is envisioned as an always-on service, the effect of these disturbances must be ameliorated by the subject ADSL transceiver.

'686 Patent at 1:24–49 (emphasis added); *see id.* at 2:4–5 ("the modem transmits data over a

multiplicity of subchannels of limited bandwidth").

The District of Delaware noted that the defendants' proposal in that case "allows the

interpretation that there is no transmission signal on channels adjacent to the channel being

measured," and the District of Delaware rejected the defendants' proposal. *Delaware Family 1*

CC Opinion at 9. Defendants do not persuasively justify departing from this finding by the

District of Delaware. In particular, Defendants do not persuasively support their assertion that

"for a channel to be idle, as required by the claim, the transceiver must be 'off.'" (Dkt. No. 135,

at 7.) At the June 1, 2022 hearing, Defendants emphasized the disclosure in the specification that refers to interference from "adjacent phone lines." *See* '686 Patent at 1:34–49 (quoted above). Defendants interpret this as meaning that the phrase "idle channel" refers to there being no transmissions on an entire "line," wherein Defendants interpret "line" as referring to physical wires. Defendants' argument is unpersuasive because the disputed term refers to a "channel," not a "line." Likewise, the District of Delaware rejected Plaintiff's proposal that only the *subchannel* on which noise is being measured must be idle. *See Delaware Family 1 CC Opinion* at 8–9. The disputed term refers to a "channel," not a "subchannel."

The Court therefore hereby construes **"array representing frequency domain received idle channel noise information"** to mean **"ordered set of values representative of noise in the frequency domain that was received by a transceiver on respective subchannels in the absence of a transmission signal on the received channel."**

VI. DISPUTED TERMS IN THE "FAMILY 2" PATENTS

Plaintiff submits that "[t]he Family 2 Patents, in general, relate to improvements to a technique known as bonding (which, in the context of DSL, refers to using multiple phone lines to transmit data)." (Dkt. No. 124, at 1 (citation omitted). Of the Family 2 Patents, only the '881 Patent is at issue in the present claim construction proceedings. Defendants submit that "the '881 Patent is asserted against CommScope only" (Dkt. No. 135, at 8 n.6), although Nokia has proposed that "reduce a difference in latency between the bonded transceivers" is indefinite (*see id.*, at 9 n.8).

The '881 Patent, titled "Systems and Methods for Multi-Pair ATM Over DSL," issued on November 18, 2008, and bears an earliest priority date of October 5, 2001. The Abstract of the '881 Patent states:

At a transmitter, an ATM cell stream is received from the ATM layer and is distributed on a cell-by-cell bases [*sic*] across multiple DSL PHY's. At the receiver, the cells from each DSL PHY are re-combined in the appropriate order to recreate the original ATM cell stream, which is then passed to the ATM layer.

The terms "utilize at least one transmission parameter value, for each transceiver in a plurality of bonded transceivers, to reduce a difference in latency between the bonded transceivers" and "utilize at least one parameter associated with operation of at least one of the first and second transceivers to reduce a difference in latency between the first and second transceivers" are identified in Defendants' portion of the P.R. 4-3 Joint Claim Construction and Prehearing Statement but not in Plaintiff's portion thereof. *Compare* Dkt. No. 107, Ex. B, at 8 *with id.*, Ex. A. Because Defendants' response brief does not address these terms, the Court concludes that these terms are no longer in dispute, and the Court therefore does not further address these terms.

5. "plurality of bonded transceivers"

"plurality of bonded transceivers" '881 Patent, Claims 17	
Plaintiff's Proposed Construction	**CommScope's Proposed Construction**
"two or more transceivers located on the same side of two or more physical links where each transceiver is configurable to transmit or receive a different portion of the same bit stream via a different one of the physical links"	"two or more transceivers, located on the same side of two or more physical links and each corresponding to one of the physical links, coordinated to transmit or receive a different portion of the same bit stream via a different one of the physical links"

(Dkt. No. 107, Ex. A, at 60; *id.*, Ex. B, at 5; Dkt. No. 146, App'x A, at 3; Dkt. No. 149, App'x A, at 38.)

(a) The Parties' Positions

Plaintiff argues that "the Patents teach that a 'bonded transceiver' is a device that, as a result of hardware and/or software, is configurable to perform bonding (just like a screwdriver is capable of driving a screw)." (Dkt. No. 124, at 8.) Plaintiff also argues that "TQ Delta's proposed construction is the one that the Delaware Court arrived at." (*Id.*) Further, Plaintiff argues that Defendants' proposal "improperly injects a use limitation into a claim written in structural terms." (*Id.* (citation and internal quotation marks omitted).)

CommScope responds that "[u]nlike TQ Delta's proposed construction, CommScope's proposed construction reflects the critical concept that the transceivers must actually do something, *i.e.*, be bonded to transmit different portions of the same bit stream." (Dkt. No. 135, at 9 (citation omitted).) CommScope argues that "[t]he applicants could have chosen language such as a 'plurality of transceivers capable of being bonded,' but they did not," and "TQ Delta should not now be permitted to rewrite the claim." (*Id.*, at 8.)

Plaintiff replies that "Defendants do not provide a reason to depart from the Delaware Court's holding that 'the recited "plurality of bonded transceivers" need not be actively bonding.'" (Dkt. No. 140, at 4 (quoting *Delaware Family 2 CC Opinion* at 11).)

At the June 1, 2022 hearing, the parties submitted that the evidence here is the same as the evidence presented to the District of Delaware on this same disputed term in the same claim. CommScope argued that the District of Delaware erred because the claims do not recite a mere capability or configurability, and CommScope urged that the specification refers to bonding in terms of actual operation.

(b) Analysis

The District of Delaware found:

The specification's disclosure that [the] system of the invention can be implemented by "physically incorporating" the elements of the claims "into a software and/or hardware system" does not suggest that actual operation of the system would be required to practice the system claims of the invention. In turn, the recited 'plurality of bonded transceivers' need not be actively bonding.

Delaware Family 2 CC Opinion at 11 (citing '881 Patent at 11:31–34); *see id.* at 6–12.

Nonetheless, the District of Delaware also noted:

Under my construction, a transceiver cannot be a "bonded transceiver" unless it contains the hardware (in the required physical arrangement) and the software necessary for bonding, in such a form that a POSA would not have to rebuild or recode the hardware or software for the transceiver to perform the bonding function. A transceiver may be a "bonded transceiver" if the hardware and software components are present in such a way that a POSA would have to activate them (e.g., by turning the transceiver on) to accomplish the bonding function, but if a POSA would have to modify source code in a transceiver, for example, the transceiver would not qualify as a "bonded transceiver."

Id. at 10 (citing '881 Patent at 16:3–6 & 19:6–19).

Based on this analysis, the District of Delaware construed "plurality of bonded transceivers" to mean "two or more transceivers located on the same side of two or more physical links where each transceiver is configurable to transmit or receive a different portion of the same bit stream via a different one of the physical links, wherein 'configurable to' precludes rebuilding, recoding, or redesigning any of the components in a 'plurality of bonded transceivers.'" *Id.* at 12.

Claim 17 of the '881 Patent, for example, recites (emphasis added):

17. A *plurality of bonded transceivers*, each bonded transceiver utilizing at least one transmission parameter value to reduce a difference in latency between the bonded transceivers, wherein a data rate for a first of the bonded transceivers is different than a data rate for a second of the bonded transceivers.

As CommScope points out, the claim does not recite transceivers merely capable of being bonded but rather recites "bonded transceivers." The other claims here at issue are similar in this regard. *See* '881 Patent, Cls. 25, 33 & 37.

The specification, however, uses the term "bonded" in contrast with "traditional" PHYs (wherein "PHYs" refers to "twisted wire pairs," *see* '881 Patent at 1:60–61) and refers to implementing the system in software and/or hardware:

> The exemplary systems and methods of this invention combine multiple DSL PHY's, i.e., multiple twisted wire pairs, to, for example, generate a high data rate connection for the transport of an ATM cell stream between the service provider and, for example, a DSL subscriber.
>
> * * *
>
> In the exemplary system illustrated in FIG. 2, two ADSL PHYs 160 and 170 are "bonded" together to transport a single ATM cell stream. However, it should be appreciated, that the number of ADSL PHYs "bonded" together can be easily expanded to any number (N≥2) of ADSL PHYs thereby, for example, enabling higher ATM data rates. In addition to the two ADSL PHYs 160 and 170 that are bonded together, it should further be appreciated that in some instances in the same access node 100, other ADSL PHYs may be operating in the traditional way. Obviously, the ADSL PHYs operating the traditional way do not need to be connected to the multi-pair multiplexer 140. Thus, in general, it should be appreciated that any combination of "bonded" and unbonded, i.e. traditional, ADSL PHY's, may be configured between the access node 100 and the broadband network determination 200. Furthermore, it should be appreciated that all of the ADSL PHYs can be bonded together.
>
> * * *
>
> The ATM over DSL system can also be implemented by physically incorporating the system and method into a software and/or hardware system, such as the hardware and software systems of a communications transceiver.

'881 Patent at 1:60–64, 4:29–45 & 11:31–34.

This disclosed contrast between "bonded" PHYs and "PHYs operating the traditional way" uses the term "bonded" not to refer to action but rather to refer to a particular type of configuration. The District of Delaware also considered this disclosure, and although the court

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found no requirement for "actively bonding" (*Delaware Family 2 CC Opinion* at 11), the court noted that "[t]he specification distinguishes 'bonded' ADSL PHYs from 'unbonded, i.e. traditional' ADSL PHYs based on whether they are actually connected to the multi-pair multiplexer, not whether they are 'configurable' to be in some sort of physical relationship with one another." *Id.* at 8 (citing '881 Patent at 4:34–45). The District of Delaware therefore included the phrase "located on the same side of two or more physical links" in the construction, and the court further clarified that "[t]his suggests that to be 'bonded,' the physical arrangement of a plurality of transceivers must meet certain physical configuration requirements." *Id.*

CommScope's proposed construction in the present case, however, would improperly "inject[] a use limitation into a claim written in structural terms." *Paragon Solutions, LLC v. Timex Corp.*, 566 F.3d 1075, 1090 (Fed. Cir. 2009); *see id.* ("[A]pparatus claims cover what a device is, not what a device does.") (quoting *Hewlett–Packard Co. v. Bausch & Lomb, Inc.*, 909 F.2d 1464, 1468 (Fed. Cir. 1990)). The *Typhoon Touch* case cited by Defendants does not compel requiring active bonding. *See Typhoon Touch Tech. Inc. v. Dell Inc.*, 659 F.3d 1376, 1380–81 (Fed. Cir. 2011) (finding no error where "[t]he district court, in reviewing the specification, held that the 'memory for storing' clause requires that the memory is *actually programmed or configured to* store the data collection application") (emphasis added).

Having reviewed the evidence and arguments presented by the parties in the present case, the Court adopts the above-discussed construction entered by the District of Delaware. Although the phrase "located on the same side of two or more physical links" in that construction requires "physical arrangement" and "physical configuration" of transceivers with regard to one another (*Delaware Family 2 CC Opinion* at 8), the disputed term refers to configuration and does not require active use.

The Court therefore hereby construes **"plurality of bonded transceivers"** to mean **"two or more transceivers located on the same side of two or more physical links where each transceiver is configurable to transmit or receive a different portion of the same bit stream via a different one of the physical links, wherein 'configurable to' precludes rebuilding, recoding, or redesigning any of the components in a 'plurality of bonded transceivers.'"**

6. "reduce a difference in latency between the bonded transceivers"

"reduce a difference in latency between the bonded transceivers" '881 Patent, Claims 17	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
"reduce a difference in configuration latency"	Indefinite, or, if not indefinite, "minimize the difference in the configuration latencies between the bonded transceivers"

(Dkt. No. 107, Ex. A, at 61; *id.*, Ex. B, at 6; Dkt. No. 146, App'x A, at 4–5; Dkt. No. 149, App'x A, at 38.)

(a) The Parties' Positions

Plaintiff submits that "[t]he Delaware Court adopted the construction that TQ Delta proposes and rejected Defendants' definiteness attack." (Dkt. No. 124, at 9 (citations omitted).) Plaintiff also argues that "[t]he specification explains that the transmission parameter values determine the configuration latency," "[a]nd the Patents provide examples of how to use transmission parameters to reduce the difference in latency between transceivers." (*Id.*, at 10 (citations omitted).) Further, Plaintiff argues that "the claims do not require comparing actual latency values (or actual data rates)." (*Id.*, at 11.)

CommScope responds that "[t]he specification states that there can be a 'latency difference,' and it describes various types of latencies, but it never explains how to 'reduce a

difference in latency' as the claim requires." (Dkt. No. 135, at 9–10.) As to disclosure in the specification regarding reducing a "configuration latency," CommScope argues that "simply reducing the difference in *configuration latency* is not sufficient to reduce the overall difference in latency *of the system.*" (*Id.*, at 10–11.) "Alternatively," CommScope argues, "if this claim term is not indefinite, the Court should adopt CommScope's proposed construction because it is consistent with the specification." (*Id.* at 11.)

Plaintiff replies: "[I]f utilizing the configuration parameters does not reduce a difference in overall latency between transceivers (*e.g.*, due to large hypothetical differences in wire latency), there would be no infringement under Defendants' view of the term. That is not a definiteness issue—when the configuration parameters *did* reduce latency, the claims would be met." (Dkt. No. 140, at 4.) Plaintiff also argues that the constituent term "reduce" does not require minimizing. (*Id.*, at 4–5.)

At the June 1, 2022 hearing, Plaintiff argued that referring to configuration latency is appropriate because, although total system latency includes wire latency, the speed of the signals is so high that any differences in wire latency are insignificant in real-world scenarios. Plaintiff also emphasized that the District of Delaware rejected a proposal to limit "reduce" to meaning "minimize." Defendants responded that the difference in configuration latency needs to be minimized by being set to zero because that is the only interpretation supported by the disclosure in the specification. Defendants also argued that although the specification discusses configuration latency, the specification does not explain what "reduce a difference" means, what the latency was beforehand, or what the latency would have been otherwise.

(b) Analysis

Claim 17 of the '881 Patent, for example, recites (emphasis added):

17. A plurality of bonded transceivers, each bonded transceiver utilizing at least one transmission parameter value to *reduce a difference in latency between the bonded transceivers*, wherein a data rate for a first of the bonded transceivers is different than a data rate for a second of the bonded transceivers.

The specification discloses:

Another effective method of *reducing the difference in latency* between DSL PHYs is mandate that all DSL PHYs are configured with transmission parameters in order to provide the same *configuration latency*. An exemplary method of accomplishing the same configuration latency is by configuring the exact same data rate, coding parameters, interleaving parameters, etc. on all DSL PHYs. Alternatively, different PHYs can have, for example, *different data rates* but use the appropriate coding or interleaving parameters to have the same latency on all the bonded PHYs.

'881 Patent at 6:56–65 (emphasis added).

In the District of Delaware, the parties presented the following proposed constructions for the term "utilizing at least one transmission parameter value to reduce a difference in latency between the bonded transceivers," and the District of Delaware construed the term as follows:

Pl.'s Proposal in Delaware (emphasis added)	Delaware Defs.' Proposal (emphasis added)	Delaware Construction (emphasis added)
"to set a value of at least one parameter used for transmission to *reduce the difference between the latencies* of the respective bonded transceivers"	"configuring at least one transmission parameter value to *minimize the difference in the configuration latencies* between the bonded transceivers"	"utilizing at least one transmission parameter value to *reduce a difference in configuration latency* between the bonded transceivers"

Delaware Family 2 CC Opinion at 16. The District of Delaware thus adopted the defendants' proposal of referring to "configuration" latency. As to the defendants' proposal of "minimize," which Defendants in the present case also propose, the District of Delaware found that "minimize" would be an "unduly narrow limitation" that would improperly limit the claim to a preferred embodiment. *Id.* at 17.

In subsequent proceedings, the District of Delaware rejected an indefiniteness challenge as to this term, finding that the defendants' arguments appeared to be based on the legal standards for written description or enablement rather than indefiniteness. *Delaware Family 2 SJ Opinion*, 373 F. Supp. 3d at 523–524. The District of Delaware also noted that the defendants' expert opined that "'there is no way to establish a reference point to determine that a difference in latency has been reduced'" and that "there is no embodiment demonstrating how to reduce rather than how to eliminate the difference in configuration latency." *Id.* (citations omitted). The District of Delaware found that "[t]he asserted claims are clear on their face as to what is claimed," and "[t]his is not an issue of whether a person of ordinary skill in the art would understand the claim scope, but an issue of whether that claim is properly supported by written description or enabled by the patent specification." *Id.* at 524.

Also of note, the specification discloses "configuration latency . . . is based on the configuration of the DSL transmission parameters . . ." which include "the data rate, coding parameters, such as the coding method, codeword size, interleaving parameters, framing parameters, or the like." '881 Patent at 6:10–15; *see id.* at 6:66–7:34; *see also id.* at 5:7–11 ("The configuration of the multi-pair multiplexing transmitter 300 can be varied to, for example, provide an equal or unequal data rate on the DSL PHYs."); *id.* at 10:40–47 ("a determination is made whether there is a difference in latency between the DSL lines").

These disclosures provide context for understanding "latency" as used in the '881 Patent. In light of these disclosures in the specification, as well as considering the above-discussed claim construction and indefiniteness analysis of the District of Delaware, the indefiniteness opinions of Defendants' expert in the present case are unpersuasive. (*See* Dkt. No. 135, Ex. 24, Mar. 14, 2022 Zimmerman Decl., at ¶¶ 61–62.)

The Court adopts the reference to "configuration latency" that was agreed upon and adopted in the District of Delaware. *See Delaware Family 2 CC Opinion* at 16 ("During oral argument, the parties agreed to the Court's proposed construction of this term, except as to how the decrease in configuration latency should be construed.") (footnote omitted). Defendants in the present case point to disclosure in the specification that refers to "end-to-end delay (latency)" as including "configuration latency" as well as "ATM-TC latency," "wire latency" and "design latency." *See* '881 Patent at 6:1–31. These other types of latency, however, do not appear to be relevant to the recital of "reduce a difference in latency between the bonded transceivers." These latencies are disclosed as follows (with reference to "twisted wire pairs," which are referred to as "PHYs" in DSL systems, *see id.* at 1:60–61):

> Th[e] potential latency difference between bonded PHYs places implementation requirements on the multi-pair multiplexer. In particular, the multi-pair multiplexer receiver must be able to reconstruct the ATM stream even if the ATM cells are not being received in the same order as they where [*sic*, were] transmitted.

> For example, some of the exemplary reasons for having different delays over different DSL PHYs include, but are not limited, configuration latency which is based on the configuration of the DSL transmission parameters. Specifically, these parameters include the data rate, coding parameters, such as the coding method, codeword size, interleaving parameters, framing parameters, or the like.

> ATM-TC latency is based on cell rate decoupling in the ATM-TC. Specifically, the ATM-TC block in ADSL transceivers performs cell rate decoupling by inserting idle cells according to the ITU Standard I.432, incorporated herein by reference in its entirety. This means that depending on the ATU timing and the state of the ATU buffers, an ATM cell that is sent over a DSL PHY will experience non-constant end-to-end delay (latency) through the PHY.

> Wire latency is based on differences in the twisted wire pairs. Specifically, the DSL electrical signals can experience different delays based on the difference in length of the wire, the gauge of the wire, the number [of] bridged taps, or the like.

> Design latency is based on differences in the DSL PHY design. Specifically, the latency of the PHY can also depend on the design chosen by the manufacture.

> Thus, as result of the different latencies in the PHYs, it is possible that an ATM cell that was sent over a DSL PHY may be received at the multi-pair multiplexing receiver after an ATM cell that was sent out later on a different DSL PHY.

Id. at 6:4–35.

This disclosure supports interpreting the disputed term as referring to configuration latency because what is relevant in the context of the present disputed term is that parameters can be configured. "Wire latency" and "design latency," by contrast, are disclosed as resulting from physical properties of the twisted wire pairs themselves, which are separate from the claimed transceivers. Because the disputed term relates to controlling a difference in latency between the transceivers, a person of ordinary skill in the art would understand that what is being controlled is the configuration of the transceivers, not the physical properties of the physical links. Also, no party has shown that the disclosure of "ATM-TC latency" affects this analysis.

As to Defendants' argument that "a difference in latency" is unclear because the actual latencies cannot be known until the transceivers are in operation, the above-cited disclosures reinforce that the claims can be understood without comparing actual latency values or actual data rates, instead requiring reducing "*a* difference in latency" (such that the difference is less than it would have otherwise been). Also, the claim in which this term appears requires "bonded transceivers," which the Court's construction (above) requires to be "located on the same side of two or more physical links." This requirement of physical links, as part of the claim limitations, provides additional context for a person of ordinary skill in the art to understand reducing a difference in latency between the bonded transceivers.

Further, as to the opinion of Defendants' expert that "it is possible to *increase* the difference in overall latency between two links by *reducing* the difference in configuration latency" (*see* Dkt. No. 135, Ex. 24, Mar. 14, 2022 Zimmerman Decl., at ¶ 61), Defendants'

argument in this regard pertains to the hypothetical performance of an implementation rather than to whether the claim language and the construction by the District of Delaware are reasonably clear.

Finally, to whatever extent Defendants are proposing that the claim scope should be limited to the specific embodiment described in above-reproduced column 6, lines 56–65 of the '881 Patent (*see* Dkt. No. 135, at 11–12), Defendants cite the general proposition that "[c]onsistent use of a term in a particular way in the specification can inform the proper construction of that term." *See Wi-LAN USA, Inc. v. Apple Inc.*, 830 F.3d 1374, 1382 (Fed. Cir. 2016). The transmission parameters cited by Defendants here, however, appear together with words and phrases such as "[a]n exemplary method" and "for example" (*see* '881 Patent at 6:56– 7:34), and on balance these specific features of a particular disclosed embodiment should not be imported into the claims. *See Phillips*, 415 F.3d at 1323.

The Court therefore hereby construes **"reduce a difference in latency between the bonded transceivers"** to mean **"reduce a difference in configuration latency between the bonded transceivers."**

7. "each bonded transceiver [utilizing/selecting] at least one transmission parameter value to reduce a difference in latency between the bonded transceivers" and "[utilize/select] at least one transmission parameter value, for each transceiver in a plurality of bonded transceivers, to reduce a difference in latency between the bonded transceivers"

"each bonded transceiver [utilizing/selecting] at least one transmission parameter value to reduce a difference in latency between the bonded transceivers" '881 Patent, Claims 17, 25	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
(None apart from proposal for the constituent term "reduce a difference in latency between the bonded transceivers")	Indefinite, or, if not indefinite, "each bonded transceiver configured with at least one transmission parameter value to minimize the difference in the configuration latencies between the bonded transceivers"

"[utilize/select] at least one transmission parameter value, for each transceiver in a plurality of bonded transceivers, to reduce a difference in latency between the bonded transceivers" '881 Patent, Claims 33, 37	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
(None apart from proposal for the constituent term "reduce a difference in latency between the bonded transceivers")	Indefinite, or, if not indefinite, "configure at least one transmission parameter value of each bonded transceiver to minimize the difference in the configuration latencies between the bonded transceivers"

(Dkt. No. 107, Ex. A, at 61; *id.*, Ex. B, at 7–8; *see* Dkt. No. 146, App'x A, at 5; Dkt. No. 149, App'x A, at 39.)

Plaintiff argues these terms together with its arguments as to the constituent term "reduce a difference in latency between the bonded transceivers." (*See* Dkt. No. 124, at 10 n.7.) Defendants present no separate argument as to these terms. (*See* Dkt. No. 135.) At the June 1, 2022 hearing, the parties agreed that these terms present the same issues as discussed above regarding the term "reduce a difference in latency between the bonded transceivers."

Also, the term "[utilize/select] at least one transmission parameter value, for each transceiver in a plurality of bonded transceivers, to reduce a difference in latency between the bonded transceivers" in Claims 33 and 37 of the '881 Patent does not appear in the parties' P.R. 4-5(d) Joint Claim Construction Chart (*see* Dkt. No. 149, App'x A), so evidently Plaintiff no longer asserts the claims in which that term appears. The Court therefore does not further address that term.

The Court therefore hereby construes **"each bonded transceiver [utilizing/selecting] at least one transmission parameter value to reduce a difference in latency between the bonded transceivers"** to have its **plain meaning** (apart from the Court's construction of the constituent term "reduce a difference in latency between the bonded transceivers," above).

VII. DISPUTED TERMS IN THE "FAMILY 3" PATENTS

Plaintiff submits that "[t]he Family 3 and 9 Patents generally relate to sharing resources, such as sharing memory between an interleaver and deinterleaver or a transmission function and a retransmission function." (Dkt. No. 124, at 1 (citation omitted).)

The '882 Patent, for example, titled "Resource Sharing in a Telecommunications Environment," issued on November 30, 2010, and bears an earliest priority date of October 12, 2004. The Abstract of the '882 Patent states:

> A transceiver is designed to share memory and processing power amongst a plurality of transmitter and/or receiver latency paths, in a communications transceiver that carries or supports multiple applications. For example, the transmitter and/or receiver latency paths of the transceiver can share an interleaver/deinterleaver memory. This allocation can be done based on the data rate, latency, BER, impulse noise protection requirements of the application, data or information being transported over each latency path, or in general any parameter associated with the communications system.

8. "shared memory," "sharing the memory," and "operable to be shared / sharing"

<table>
<tr><td colspan="2">

"shared memory"
'882 Patent, Claims 9, 13;
'048 Patent, Claims 1, 5;
'510 Patent, Claims 21, 22

"sharing the memory"
'5473 Patent, Claim 10

"operable to be shared / sharing"
'608 Patent, Claim 2

</td></tr>
<tr><td>**Plaintiff's Proposed Construction**</td><td>**Defendants' Proposed Construction**</td></tr>
<tr><td>

"shared memory":
   "common memory used by at least two functions, where a portion of the memory can be used by either one of the functions"

</td><td>Plain and ordinary meaning</td></tr>
</table>

(Dkt. No. 107, Ex. A, at 65; *id.*, Ex. B, at 9; Dkt. No. 146, App'x A, at 5; Dkt. No. 149, App'x A, at 39–40.)

(a) The Parties' Positions

Plaintiff submits that "TQ Delta's proposal matches how the Delaware Court construed this term." (Dkt. No. 124, at 12 (citations omitted).) Plaintiff further submits that the construction by the District of Delaware "aligns with the record" and "[a] Delaware jury rendered a verdict under that construction, and this construction will help the jury here understand this term." (*Id.*) Plaintiff also argues that "[t]he claims recite 'allocating' (or a related word) the shared memory between an interleaver and deinterleaver, which reflects that each allocated portion can be used by either the interleaver or deinterleaver—but not both." (*Id.*, at 13.) Plaintiff urges: "Defendants' plain-and-ordinary meaning construction ignores the context of the intrinsic record—and asserts that any type of memory that could be used by more

than one function at any time, *i.e.*, essentially all memory, is shared memory. But that is not how the Patents use the term, which refers to a common memory allocated between two functions." (*Id.*, at 13–14.)

Defendants respond that "Defendants in this case should not be limited to positions taken by 2Wire" in the District of Delaware, and "TQ Delta's proposed construction improperly narrows the claim language by injecting confusion into a term that was well known to a POSITA at the time of the invention, again without even attempting to support its construction with evidence of disclaimer or lexicography." (Dkt. No. 135, at 12.) Defendants argue that "[n]owhere do the claims require that the same portion of th[e] memory be used by both the interleaver and deinterleaver," and "TQ Delta likewise fails to point to any lexicography or disclaimer in the specification that would limit a POSITA's understanding of a shared memory to this specific implementation." (*Id.*, at 13.)

Plaintiff replies by reiterating that the District of Delaware was correct and that "[t]he plain meaning of a 'shared' resource is that it can be used by multiple things (*e.g.*, a car shared between two people is one that both people can access and drive)." (Dkt. No. 140, at 5.)

At the June 1, 2022 hearing, Plaintiff re-urged that if spaces within a memory structure can only ever be allocated to one function, then that memory structure is not a "shared memory." Defendants responded that the District of Delaware erred by importing a limitation that appears only in some claims, such as Claim 2 of the '608 Patent. Defendants also argued that the construction by the District of Delaware improperly excludes "ping pang" memory (which Defendants submitted is also known as "ping pong" memory).

(b) Analysis

As a threshold matter, the parties have discussed whether certain prior art reference examples of memory can qualify as "shared memory," such as what the parties have referred to as "interprocessor" memory or, as another example, a type of memory known as "ping pang" or "ping pong" memory. These issues pertain to specific invalidity arguments that perhaps may be affected by the Court's claim construction, but the applicability of those prior art references is not presently before the Court. *See Phillips*, 415 F.3d at 1327 ("we have certainly not endorsed a regime in which validity analysis is a regular component of claim construction") (citation omitted).

Turning to the claim language, Claim 9 of the '882 Patent, for example, recites (emphasis added; formatting modified):

> 9. A system that allocates *shared memory* comprising:
>   a transceiver that performs:
>   transmitting or receiving a message during initialization specifying a maximum number of bytes of memory that are available to be allocated to an interleaver;
>   determining an amount of memory required by the interleaver to interleave a first plurality of Reed Solomon (RS) coded data bytes within a *shared memory*;
>   allocating a first number of bytes of the *shared memory* to the interleaver to interleave the first plurality of Reed Solomon (RS) coded data bytes for transmission at a first data rate, wherein the allocated memory for the interleaver does not exceed the maximum number of bytes specified in the message;
>   allocating a second number of bytes of the *shared memory* to a deinterleaver to deinterleave a second plurality of RS coded data bytes received at a second data rate; and
>   interleaving the first plurality of RS coded data bytes within the *shared memory* allocated to the interleaver and deinterleaving the second plurality of RS coded data bytes within the *shared memory* allocated to the deinterleaver, wherein the *shared memory* allocated to

the interleaver is used at the same time as the *shared memory* allocated to the deinterleaver.

The specification uses the term "share" to refer to a resource being used by multiple "paths." *See, e.g.,* '882 Patent at Abstract ("A transceiver is designed to share memory and processing power amongst a plurality of transmitter and/or receiver latency paths, in a communications transceiver that carries or supports multiple applications.") & 4:59–62 ("The shared memory 120 is shared amongst the two transmitter portion interleavers 216 and 226 and two receiver portion deinterleavers 316 and 326.").

The District of Delaware construed "shared memory" to mean "common memory used by at least two functions, where a portion of the memory can be used by either one of the functions." *Delaware Family 3 CC Opinion* at 5. In that case, the "[d]efendants d[id] not contest that for these patents, at any one time, a certain part of the memory can be used by one function or the other, but not both." *Delaware Family 3 CC Opinion* at 6; *see id.* at 5–7; *see also Delaware Family 9 CC Opinion* at 15 ("Defendants do not contest that for these patents, at any one time, a certain part of the memory can be used by one function or the other, but not both.").

The specification is consistent with finding that a particular portion of a shared memory can be used by only one function at a time:

> [A]n exemplary transceiver can comprise a shared interleaver/deinterleaver memory, such as shared memory 120, and be designed to allocate a first portion of shared memory 120 to a first interleaver, e.g., 216, in the transmitter portion of the transceiver and allocate a second portion of the shared memory to a second interleaver, e.g., 226, in the transmitter portion of the transceiver.

'882 Patent at 5:40–46.

Defendants submit the opinions of their expert that "[w]hether to use the *same location* of memory for multiple functions is a choice that a person of ordinary skill in the art makes about

how to use a shared memory rather than a defining characteristic of a shared memory." (Dkt. No. 135, Ex. 25, Mar. 14, 2022 Wesel Decl., at ¶ 45.) Defendants' expert also opines:

> With random access memories (RAMs), for example, the location where bytes or words of memory are written or read is provided to an address register, and functions are often allocated memory space by assigning to the function a range of addresses. In these circumstances, it might be that multiple functions share the RAM but input addresses into the register and [*sic*] are assigned so that the functions use the memory space without ever using the same portion of memory even though the functionality of the RAM makes it possible and easy for multiple functions to use the same portion of memory. In cases like this, it would be unclear whether, under Plaintiff's construction that requires that "a portion of the memory can be used by either one of the functions," such a memory would meet those requirements.

(*Id.* at ¶ 43; *see id.* at ¶¶ 42–45.)

In reply, Plaintiff urges that Defendants are attempting to read "shared" out of the term "shared memory" by suggesting that different functions could use different memory spaces, thus never using the same portion of the purportedly "shared" memory. (Dkt. No. 140, at 5.) Plaintiff thus appears to argue that, for the "shared memory" limitation to be met, the same *portion* of memory *must* be used by the multiple functions (just not at the same time). (*See id.*)

This apparent position (*id.*) lacks support in the intrinsic evidence and indeed is inconsistent with the claim language reciting "allocating" particular bytes of memory for particular functions *without* reciting *re*allocating the same bytes of memory for different functions. At the June 1, 2022 hearing, Plaintiff clarified that memory can be "shared" without a particular memory space necessarily being used by more than one function over time, so long as the system is configured such that the units of memory within the "shared memory" are each accessible by multiple functions and the relevant source code allows for allocating a unit of memory to different functions over time. The Court agrees, thus finding that "shared memory" does *not* require that the same units of memory must be used by more than one function over

time but *does* require that the system is configured such that each unit of memory can be allocated to different functions over time.

With that understanding, the Court hereby construes these disputed terms as set forth in the following chart:

Term	Construction
"shared memory" **"a memory wherein the memory is operable to be shared"**	**"common memory used by at least two functions, where a portion of the memory can be used by either one of the functions"**
"sharing the memory"	**"using a common memory used by at least two functions, where a portion of the memory can be used by either one of the functions"**

9. "wherein the generated message indicates how the memory has been allocated between the interleaving function and the deinterleaving function"

10. "a message indicating how the shared memory is to be used by the interleaver or deinterleaver"

"wherein the generated message indicates how the memory has been allocated between the interleaving function and the deinterleaving function" '5473 Patent, Claim 28	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary.	Plain and ordinary meaning, i.e., "the message indicates the amount of memory that has been allocated to the [first deinterleaving / interleaving] function and the amount of memory that has been allocated to the [second] deinterleaving function"

<table>
<tr><td colspan="2" align="center">"a message indicating how the shared memory is to be used by the interleaver or deinterleaver"
'5473 Patent, Claim 10</td></tr>
<tr><td>Plaintiff's Proposed Construction</td><td>Defendants' Proposed Construction</td></tr>
<tr><td>Plain and ordinary meaning. No construction necessary.</td><td>Plain and ordinary meaning, i.e., "the message indicates the amount of memory that is to be used by the interleaving function and the amount of memory that is to be used by the deinterleaving function"</td></tr>
</table>

(Dkt. No. 107, Ex. A, at 72; *id.*, Ex. B, at 10; Dkt. No. 146, App'x A, at 6; Dkt. No. 149, App'x A, at 46.)[1]

(a) The Parties' Positions

Plaintiff submits: "It is true that the Delaware Court, adopting TQ Delta's proposal, construed one of these terms in the manner Defendants propose here. But the parties in Delaware were addressing a different dispute," and "[t]here was no discussion of the difference, if any, between TQ Delta's proposed construction and the plain meaning of this term." (Dkt. No. 124, at 15 (citation omitted).) "TQ Delta's concern is that Defendants, through the 'amount of memory' language, may resurrect the rejected 'number of bytes' argument before the jury." (*Id.*)

Defendants respond that "[a]s TQ Delta admits, in the Delaware litigation, TQ Delta proposed the construction now put forth by Defendants in this case," and "TQ Delta does not

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[1] Defendants' proposal for these respective terms has been inferred from their amalgamated proposal as to both terms. (*See* Dkt. No. 107, Ex. B, at 10 ("Plain and ordinary meaning, i.e., 'the message indicates the amount of memory [that has been allocated to / is to be used by] the [first deinterleaving / interleaving] function and the amount of memory [that has been allocated to / is to be used by] the [second] deinterleaving function.'"); *see also* Dkt. No. 149, App'x A, at 46–47 (same).)

appear to disagree with this construction, nor can it, given that it is estopped from doing so." (Dkt. No. 135, at 14 (citations omitted; emphasis omitted).)   Defendants also argue that Plaintiff's concern regarding the "number of bytes" argument is unfounded but "Defendants agree not to assert that the meaning of this claim language is limited to indicating 'a number of bytes of memory.'" (*Id.*, at 14–15.)

Plaintiff replies that "Defendants do not identify a claim-scope dispute or what their construction excludes that the plain claim language would encompass," and "[g]iven that Defendants now 'agree not to assert that the meaning of this claim language is limited to indicating "a number of bytes of memory,"' there is no need to construe this term." (Dkt. No. 140, at 5–6.)

(b) Analysis

Claim 28 of the '5473 Patent recites (emphasis added):

28. An apparatus comprising:
        a multicarrier communications transceiver that is configured to generate a message during an initialization of the transceiver, perform an interleaving function associated with a first latency path, and perform a deinterleaving function associated with a second latency path, the transceiver being associated with a memory,
        wherein at least a portion of the memory may be allocated to the interleaving function or the deinterleaving function at any one particular time and *wherein the generated message indicates how the memory has been allocated between the interleaving function and the deinterleaving function.*

The District of Delaware construed "wherein the generated message indicates how the memory has been allocated between the [first deinterleaving / interleaving] function and the [second] deinterleaving function" to mean "wherein the generated message indicates the amount of memory that has been allocated to the [first deinterleaving / interleaving] function and the amount of memory allocated to the [second] deinterleaving function," which was the construction that Plaintiff proposed in that case. *Delaware Family 3 CC Opinion* at 15. The

court also found, as to the term "amount of memory": "[T]he term is broader than 'bytes,' and the jury will not have trouble deciding what is or is not an 'amount of memory.' Accordingly, I adopt a plain meaning construction. The plain meaning is not limited to bytes, and Defendants cannot argue that it is." *Id.* at 8.

In the present case, whereas Plaintiff expresses concern that "amount of memory" might be misinterpreted as being limited to a number of bytes of memory, Defendants "agree not to assert that the meaning of this claim language is limited to indicating 'a number of bytes of memory.'" (Dkt. No. 135, at 14–15.) Plaintiff therefore does not persuasively justify departing from the Delaware construction, which is the construction that Plaintiff proposed in that case. The Court need not reach Defendants' argument that Plaintiff is estopped from proposing a different construction.

At the June 1, 2022 hearing, Plaintiff argued that its main dispute in the District of Delaware related to the phrase "amount of memory" (which was presented as a disputed term in that case but which does not appear in the claims here at issue). Plaintiff argued that this is why Plaintiff included "amount of memory" in its proposal for the "message" term in that case. Plaintiff's arguments are unpersuasive because the recital of "allocated" connotes an amount, and, again, the Court need resolve any issue of whether Plaintiff is estopped from proposing a different construction. Plaintiff also argued at the June 1, 2022 hearing that memory allocation could be specified as a fraction, a percentage, or as some indication in relation to speed, but Plaintiff did not raise this issue in its briefing and, at least upon the present record, these hypotheticals appear to relate to implementation details that would potentially raise factual issues regarding infringement rather than any legal question for claim construction. *See PPG*, 156 F.3d

at 1355; *see also Acumed*, 483 F.3d at 806 (citing *PPG*); *Eon*, 815 F.3d at 1318–19 (citing *PPG*; citing *Acumed*).

As to the different term "a message indicating how the shared memory is to be used by the interleaver or deinterleaver" in Claim 10 of the '5473 Patent, however, this term does not use the word "allocated." At the June 1, 2022 hearing, Defendants argued that the word "used" is used in the specification in the same way as "allocated," both of which, Defendants argue, refer to an *amount* of memory. On balance, Defendants do not persuasively justify limiting the constituent phrase "how the shared memory is to be used" to indicating amounts of memory for the interleaver and deinterleaver. The opinions of Defendants' expert do not compel the narrowing proposed by Defendants. (*See* Dkt. No. 135, Ex. 25, Mar. 14, 2022 Wesel Decl., at ¶¶ 47–49.) The Court therefore hereby expressly rejects Defendants' proposed construction for the term "a message indicating how the shared memory is to be used by the interleaver or deinterleaver." No further construction of that term is necessary. *See U.S. Surgical*, 103 F.3d at 1568; *see also O2 Micro*, 521 F.3d at 1362; *Finjan*, 626 F.3d at 1207; *ActiveVideo*, 694 F.3d at 1326; *Summit 6*, 802 F.3d at 1291; *Bayer*, 989 F.3d at 977–79.

The Court therefore hereby construes these disputed terms as set forth in the following chart:

Term	Construction
"wherein the generated message indicates how the memory has been allocated between the interleaving function and the deinterleaving function"	**"wherein the generated message indicates the amount of memory that has been allocated to the interleaving function and the amount of memory allocated to the deinterleaving function"**
"a message indicating how the shared memory is to be used by the interleaver or deinterleaver"	**Plain meaning**

11. "specifying a maximum number of bytes of memory that are available to be allocated to [a/an interleaver/deinterleaver]"

"specifying a maximum number of bytes of memory that are available to be allocated to [a/an interleaver/deinterleaver]" '882 Patent, Claims 9, 13 '048 Patent, Claims 1, 5	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary.	Plain and ordinary meaning, where the message must specify a maximum number of bytes.

(Dkt. No. 107, Ex. A, at 72; *id.*, Ex. B, at 10; Dkt. No. 135, at 2; *see* Dkt. No. 146, App'x A, at 6; *see also* Dkt. No. 149, App'x A, at 48.)

(a) Analysis

Plaintiff asserts: "The parties agree 'specifying a maximum number of bytes of memory that are available to be allocated to [a/an interleaver/deinterleaver]' in claims 9 and 13 of the '882 Patent and claims 1 and 5 should be construed as plain-and-ordinary meaning. Dkt. 107-1, at 73 ('Plain and ordinary meaning. No construction necessary.'); Dkt. 107-2, at 10 ('Plain and ordinary meaning')." (Dkt. No. 124, at 2.)

Defendants respond that "while TQ Delta's brief is unclear, TQ Delta's Infringement Contentions indicate that TQ Delta takes a broader position that reads out the requirement— stated directly in the claim term itself—that the message specify the *maximum number of bytes*." (Dkt. No. 135, at 1 (citing '882 Patent at 8:60–9:4).)   Defendants propose construing this disputed term as: "plain and ordinary meaning, where the message must specify a maximum number of bytes." (*Id.*, at 2.)

Plaintiff replies: "Defendants' late attempt to construe this term should be rejected. They did not raise any construction in the P.R. 4-3 statement and thus waived the issue. Dkt. 107-2, at 10 ('Plain and ordinary meaning').   Defendants now raise an (incorrect) improper infringe[ment] argument." (Dkt. No. 140, at 6.)

(b) Analysis

Claim 9 of the '882 Patent, for example, recites (emphasis added; formatting modified):

9. A system that allocates shared memory comprising:
>   a transceiver that performs:
>>   transmitting or receiving a message during initialization *specifying a maximum number of bytes of memory that are available to be allocated to an interleaver*;
>>   determining an amount of memory required by the interleaver to interleave a first plurality of Reed Solomon (RS) coded data bytes within a shared memory;
>>   allocating a first number of bytes of the shared memory to the interleaver to interleave the first plurality of Reed Solomon (RS) coded data bytes for transmission at a first data rate, wherein the allocated memory for the interleaver does not exceed the maximum number of bytes specified in the message;
>>   allocating a second number of bytes of the shared memory to a deinterleaver to deinterleave a second plurality of RS coded data bytes received at a second data rate; and
>>   interleaving the first plurality of RS coded data bytes within the shared memory allocated to the interleaver and deinterleaving the second plurality of RS coded data bytes within the shared memory allocated to the deinterleaver, wherein the shared memory allocated to the interleaver is used at the same time as the shared memory allocated to the deinterleaver.

Defendants' proposal of "where the message must specify a maximum number of bytes" simply repeats the language of this claim limitation itself, which already recites (emphasis added): "transmitting or receiving *a message* during initialization *specifying a maximum number of bytes* of memory that are available to be allocated to an interleaver." That is, the claim already

recites that the "message" specifies the maximum number of bytes. The other claims here at issue are the same in this regard. *See* '882 Patent, Cl. 13; *see also* '048 Patent, Cls. 1 & 5. At the June 1, 2022 hearing, Plaintiff agreed that the "message" specifies the maximum number of bytes. The Court therefore hereby expressly rejects Defendants' proposed construction as redundant and as tending to confuse rather than clarify the scope of the claims.

Instead, at least at this stage, Defendants' argument regarding Plaintiff's infringement contentions relates to the sufficiency of Plaintiff's proof on infringement rather than any legal question for claim construction. *See PPG*, 156 F.3d at 1355; *see also Acumed*, 483 F.3d at 806 (citing *PPG*); *Eon*, 815 F.3d at 1318–19 (citing *PPG*; citing *Acumed*). As the Court stated at the June 1, 2022 hearing, the Court fully expects the parties to raise *no later than at the summary judgment stage* any underlying claim construction issue regarding this term that arises because of the particular infringement issues presented in this case.

On that basis, the Court hereby construes **"specifying a maximum number of bytes of memory that are available to be allocated to [a/an interleaver/deinterleaver]"** to have its **plain meaning**.

VIII. DISPUTED TERMS IN THE "FAMILY 4" PATENTS

Plaintiff submits that "[t]he Family 4 Patents generally relate to techniques to reduce the peak-to-average-ratio[] ('PAR') of a carrier signal by scrambling the phase characteristics of the carrier signals." (Dkt. No. 124, at 1 (citation omitted).)

The '008 Patent, titled "System and Method for Scrambling the Phase of the Carriers in a Multicarrier Communications System," issued on January 3, 2012, and bears an earliest priority date of November 9, 1999. The Abstract of the '008 Patent states:

A system and method that scrambles the phase characteristic of a carrier signal are described. The scrambling of the phase characteristic of each carrier signal

includes associating a value with each carrier signal and computing a phase shift for each carrier signal based on the value associated with that carrier signal. The value is determined independently of any input bit value carried by that carrier signal. The phase shift computed for each carrier signal is combined with the phase characteristic of that carrier signal so as to substantially scramble the phase characteristic of the carrier signals. Bits of an input signal are modulated onto the carrier signals having the substantially scrambled phase characteristic to produce a transmission signal with a reduced PAR.

12. "phase characteristic(s)"

"phase characteristic(s)" "each carrier signal has a phase characteristic associated with the bit stream" '008 Patent, Claim 14	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
"one or more values that represent the angular aspect of a carrier signal"	Plain and ordinary meaning

(Dkt. No. 107, Ex. A, at 79; *id.*, Ex. B, at 12; Dkt. No. 146, App'x A, at 6; Dkt. No. 149, App'x A, at 53.)

(a) The Parties' Positions

Plaintiff argues that "TQ Delta's proposed construction is the construction adopted by the Delaware Court," and "Defendants have not articulated a substantive claim scope dispute with respect to TQ Delta's proposed construction." (Dkt. No. 124, at 16.) Plaintiff urges that "TQ Delta's proposed construction tracks the clear teaching of the specification that a phase characteristic of a carrier signal is a value (e.g., the QAM symbol constellation points) that represents the angular aspect of the carrier signal." (*Id.*)

Defendants respond: "[R]ather than provide clarity, TQ Delta's construction simply risks confusing the jury, requiring explanation of QAM symbol constellation points and 'angular aspects of a carrier signal.' Also, TQ Delta's proposal is overly restrictive. Many 'phase

characteristics' may exist for a carrier signal, but TQ Delta's construction limits those characteristics to values that 'represent the angular aspect' of that carrier signal." (Dkt. No. 135, at 15 (citations omitted).)

Plaintiff replies that "QAM encoding will need to be explained to the jury as background of the technology anyway," and "[t]he fact that there may be 'infinite' ways to express phase characteristics says nothing about whether TQ Delta's proposed construction is overly restrictive." (Dkt. No. 140, at 6.)

At the June 1, 2022 hearing, Plaintiff argued that Defendants are opposing Plaintiff's proposed construction because Defendants hope that the jury will be looking for numbers of degrees or radians rather that the digital representations that computers actually use to describe phase characteristics, such as what Plaintiff referred to as an "(X,Y) pair" or an "(I,Q) pair." As to the construction by the District of Delaware, Plaintiff argued that the phrase "a constellation point" would be confusing and so Plaintiff proposes instead referring to "a carrier signal." Defendants responded that this disputed term should be given its plain meaning in the present case because the construction by the District of Delaware was directed to a specific dispute regarding QAM modulation that is not at issue in the present case.

(b) Analysis

Defendants object in their portion of the P.R. 4-3 Joint Claim Construction and Prehearing Statement that Plaintiff's proposed construction is untimely because Plaintiff did not include this term in Plaintiff's P.R. 4-1 disclosures. (Dkt. No. 107, Ex. B, at 12 n.3.) Defendants have not included this objection in their Responsive Claim Construction Brief (*see* Dkt. No. 135), so Defendants evidently no longer assert this objection.

Claim 14 of the '008 Patent recites (emphasis added):

14.   A multicarrier system including a first transceiver that uses a plurality of carrier signals for modulating a bit stream, wherein each carrier signal has a *phase characteristic* associated with the bit stream, the transceiver capable of:

associating each carrier signal with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined using a pseudo-random number generator;

computing a phase shift for each carrier signal based on the value associated with that carrier signal; and

combining the phase shift computed for each respective carrier signal with the *phase characteristic* of that carrier signal to substantially scramble the *phase characteristics* of the plurality of carrier signals, wherein multiple carrier signals corresponding to the scrambled carrier signals are used by the first transceiver to modulate the same bit value.

The District of Delaware construed "phase characteristics" to mean "one or more values that represent the angular aspect of a constellation point." *See TQ Delta, LLC v. ADTRAN, Inc.*, No. 1:14-CV-00954-RGA, Dkt. No. 1377 (D. Del. Mar. 1, 2022).

The parties appear to agree that the word "phase," in the context of signal characteristics, is a well-established term of art, and Plaintiff submits its expert's understanding of "constellation points" in this context. (*See, e.g.,* Dkt. No. 124, Ex. 11, Mar. 2022 Madisetti Decl. at ¶¶ 26, 27, 34–36 & 69.)   Defendants cite statements by Plaintiff's counsel during a claim construction hearing in the District of Delaware that "there are numerous ways that one skilled in the art would understand that a phase characteristic can be expressed" and that there could be "infinite" phase characteristics.   (*See* Dkt. No. 135, Ex. 34, Mar. 18, 2021 Hr'g Tr. at 19 & 25.)   Defendants have not identified any contradiction between those cited statements and the construction proposed by Plaintiff in the present case.   For example, Plaintiff's statements regarding "infinite" phase characteristics, when read in context, can be understood as stating that a particular phase characteristic may have an infinite number of possible values. (*See id.* at 19.)

Nonetheless, Plaintiff does not persuasively support its proposal of modifying the District of Delaware construction so as to refer to an "angular aspect of a carrier signal" rather than an

"angular aspect of a constellation point." At the June 1, 2022 hearing, Plaintiff attempted to explain its divergence from the construction of the District of Delaware, but the transcript of the proceeding in the District of Delaware reflects that the court relied upon Plaintiff's acceptance of the phrase "constellation point" in that case and found that "constellation point" more precisely tethered the construction to modulation than did Plaintiff's proposal of "carrier signal." *See TQ Delta, LLC v. ADTRAN, Inc.*, No. 1:14-CV-00954-RGA, Dkt. No. 1388, Mar. 1, 2022 Tr. at 119:1–8 (discussing Plaintiff's expert's proposal of "one or more values that represent the angular aspect of the carrier signal"); *see also id.* at 141:17–23. That transcript also reflects a general impression that the District of Delaware "do[es]n't really think that there's much of a dispute between [the experts, and] I think the disputes here more go to, I assume, infringement, possibly invalidity, and they are a matter for a different kind of hearing than claim construction." *Id.* at 143:9–13. Finally, the declaration of Plaintiff's expert in the present case reflects an understanding of "constellation points" in the relevant context. (*See, e.g.,* Dkt. No. 124, Ex. 11, Mar. 2022 Madisetti Decl. at ¶¶ 34–36.)

Based on all of the foregoing, the Court hereby construes **"phase characteristic(s)"** to mean **"one or more values that represent the angular aspect of a constellation point."**

13. "substantially scramble the phase characteristics of the plurality of carrier signals"

"substantially scramble the phase characteristics of the plurality of carrier signals" '008 Patent, Claim 14	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
"adjust the phase characteristics of the carrier signals by varying amounts to produce a transmission signal with a reduced peak[-]to-average power ratio (PAR)"	Plain and ordinary meaning

(Dkt. No. 107, Ex. A, at 80; *id.*, Ex. B, at 11; Dkt. No. 146, App'x A, at 7; Dkt. No. 149, App'x A, at 54.)

(a) The Parties' Positions

Plaintiff argues that "TQ Delt[a] proposes the construction of this term adopted by the Delaware Court," and "Defendants have not raised a substantive dispute with that construction." (Dkt. No. 124, at 17.) Plaintiff also cites disclosures in the specification for support. (*Id.*)

Defendants respond that "TQ Delta's construction should be rejected in favor of the plain and ordinary meaning," and "[i]t is well established that importing functional language from the specification into a term's construction is inappropriate." (Dkt. No. 135, at 16 (citations omitted).)

Plaintiff replies that "[c]laiming a functional result is not per se improper," and "TQ Delta's proposed construction simply defines what that claimed result—'to substantially scramble'—means." (Dkt. No. 140, at 7.)

(b) Analysis

Claim 14 of the '008 Patent recites (emphasis added):

14. A multicarrier system including a first transceiver that uses a plurality of carrier signals for modulating a bit stream, wherein each carrier signal has a phase characteristic associated with the bit stream, the transceiver capable of:
        associating each carrier signal with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined using a pseudo-random number generator;
        computing a phase shift for each carrier signal based on the value associated with that carrier signal; and
        combining the phase shift computed for each respective carrier signal with the phase characteristic of that carrier signal to *substantially scramble the phase characteristics of the plurality of carrier signals*, wherein multiple carrier signals corresponding to the scrambled carrier signals are used by the first transceiver to modulate the same bit value.

The District of Delaware construed this disputed term to mean "adjust the phase characteristics of the carrier signals by varying amounts to produce a transmission signal with a reduced peak-to-average power ratio (PAR)." *Delaware Family 4 CC Opinion* at 6. In doing so, the District of Delaware rejected an indefiniteness challenge (based on the word "substantially"), finding that "[i]n light of the supplemental declaration of Plaintiffs expert, Dr. Cooklev, I am persuaded that a person of ordinary skill in the art would understand how much scrambling one would perform to 'substantially scramble,' that is, to scramble the phase characteristics with the object of reducing PAR." *Id.* at 7. The District of Delaware thus adopted Plaintiff's proposal of the phrase "to produce a transmission signal with a reduced peak-to-average power ratio (PAR)." *See id.* at 6–8. Plaintiff proposes the Delaware construction in the present case.

Plaintiff also cites disclosure in the specification that scrambling the phase characteristics of carrier signals "produce[s] a transmission signal with a reduced PAR," wherein "PAR" refers to peak-to-average power ratio. '008 Patent at Abstract; *see id.* at 1:26–29 ("[T]he invention relates to multicarrier communications systems that lower the peak-to-average power ratio (PAR) of transmitted signals."); *see also id.* at 2:44–47 ("[T]he input bit stream is modulated onto the carrier signals having the substantially scrambled phase characteristic to produce a transmission signal with a reduced peak-to-average power ratio (PAR)."); *id.* at 6:49–53 ("By scrambling the phase characteristics of the carrier signals, the phase scrambler 66 reduces (with respect to unscrambled phase characteristics) the combined PAR of the plurality of carrier signals and, consequently, the transmission signal 38.").

Defendants argue that the Delaware construction improperly imported functional language from the specification, and that "TQ Delta provides no argument regarding disclaimer, disavowal, or lexicography to support its construction." (Dkt. No. 135, at 16.) Defendants cite,

for example, the proposition that: "[T]he fact that the claimed composition was designed to solve certain problems of the prior art and the fact that the patentee noted the functional import of having a [particular feature] does not mean that we must attribute a function to [a] nonfunctional phrase . . . . Where the function is not recited in the claim itself by the patentee, we do not import such a limitation." *Ecolab, Inc. v. Envirochem, Inc.*, 264 F.3d 1358, 1367 (Fed. Cir. 2001) (citation omitted).

Defendants' argument is unpersuasive because the claim itself recites the disputed term as "combining . . . to substantially scramble . . .," so this limitation *is* expressly recited in functional terms, and the construction by the District of Delaware clarifies the nature of this recited functionality. *See id.* The District of Delaware considered specification disclosures as well as expert opinion and reached a conclusion regarding how a person of ordinary skill in the art would understand the "substantially scrambled" term, particularly given that "the specifications indicate that, at a minimum, the goal is to reduce PAR." *Delaware Family 4 CC Opinion* at 8. The District of Delaware cited disclosures in United States Patent No. 7,292,627, and the '088 Patent here at issue is a descendent of the '627 Patent (related through a series of continuation patent applications). *Id.* (citing '627 Patent at 1:19–22, 2:41–45 & 6:55–59). Defendants do not persuasively justify departing from the construction reached by the District of Delaware.

At the June 1, 2022 hearing, Defendants cited a dependent claim of the ancestor '627 Patent that recites "modulating bits of the input bit stream onto the carrier signals having the substantially scrambled phase characteristics to produce a transmission signal with a reduced peak-to-average power ratio (PAR)." '627 Patent, Cl. 2. Defendants' argument is, or is akin to, a claim differentiation argument, but the doctrine of claim differentiation is "a guide, not a rigid

rule." *Wi-LAN USA, Inc. v. Apple Inc.*, 830 F.3d 1374, 1391 (Fed. Cir. 2016) (citation and internal quotation marks omitted); *see Multilayer Stretch Cling Film Holdings, Inc. v. Berry Plastics Corp.*, 831 F.3d 1350, 1360 (Fed. Cir. 2016) ("The dependent claim tail cannot wag the independent claim dog."); *see also N. Am. Vaccine, Inc. v. Am. Cyanamid Co.*, 7 F.3d 1571, 1577 (Fed. Cir. 1993) (same).

Also, whereas dependent Claim 2 of the '627 Patent *adds* a limitation of "modulating bits of the input stream onto the carrier signals," the claim here at issue (Claim 14 of the '008 Patent, reproduced above) already recites that the scrambled carrier signals are used to modulate. The absence of a modulating step in independent Claim 1 of the '627 Patent perhaps explains why a reference to peak-to-average power ratio is added in a dependent claim (together with a step of modulating). Thus, whereas a modulation requirement accompanies the disputed language in dependent Claim 2 of the '627 Patent, a modulation requirement is already present in Claim 14 of the '008 Patent. Dependent Claim 2 of the '627 Patent therefore does *not* weigh against construing Claim 14 with reference to peak-to-average power ratio.

The Court accordingly hereby construes **"substantially scramble the phase characteristics of the plurality of carrier signals"** to mean **"adjust the phase characteristics of the carrier signals by varying amounts to produce a transmission signal with a reduced peak-to-average power ratio (PAR)."**

14. "same bit value"

15. "multiple carrier signals corresponding to the scrambled carrier signals are used by the first multicarrier transceiver to modulate the same bit value"

<table>
<tr><td colspan="2" align="center">"same bit value"
'008 Patent, Claim 14</td></tr>
<tr><td>Plaintiff's Proposed Construction</td><td>Defendants' Proposed Construction</td></tr>
<tr><td>"value of the same bit"</td><td>Indefinite</td></tr>
<tr><td colspan="2" align="center">"multiple carrier signals corresponding to the scrambled carrier signals are used by the first multicarrier transceiver to modulate the same bit value"
'008 Patent, Claim 14</td></tr>
<tr><td>Plaintiff's Proposed Construction</td><td>Defendants' Proposed Construction</td></tr>
<tr><td>"a first carrier signal is used by the first multicarrier transceiver to ~~de~~modulate the value of a bit ~~of the received bit stream~~ and at least one more carrier signal is used by the first multicarrier transceiver to ~~de~~modulate the value of the same bit ~~of the received bit stream~~, wherein the carrier signals correspond to the plurality of phase-shifted and scrambled carrier signals"[2]</td><td>Indefinite</td></tr>
</table>

(Dkt. No. 107, Ex. A, at 80–82; *id.*, Ex. B, at 11; Dkt. No. 146, App'x A, at 7; Dkt. No. 149,

App'x A, at 55.)

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[2] Deletions by Plaintiff's counsel during the June 1, 2022 hearing are shown in strikeout. Plaintiff also previously proposed: "a first carrier signal is used by the first multicarrier transceiver to *modulate* the value of a bit of the received bit stream and at least one more carrier signal is used by the first multi carrier transceiver to *modulate* the value of the same bit of the received bit stream, wherein the carrier signals correspond to the plurality of phase-shifted and scrambled carrier signals." (Dkt. No. 107, Ex. A, at 81–82 (emphasis added).)

(a) The Parties' Positions

Plaintiff argues that whereas "Defendants argue that the 'same bit value' could refer to either the bit position or the value of the bit," "the specification, as Defendants recognize, explains that the 'bit value' refers to the data carried by a carrier signal." (Dkt. No. 124, at 18 (citations omitted).)

Defendants respond: "Both of these terms refer to the 'same bit value,' which is indefinite because a POSITA would not understand with reasonable certainty whether 'same bit value' refers to the same bit position or instead refers to the same bit value as between 0's and 1's. As discussed below, TQ Delta itself has taken inconsistent positions regarding this term, demonstrating that the term is indefinite: TQ Delta adopted the former construction (same bit position) in Delaware, but now proposes a different construction (value of the same bit)." (Dkt. No. 135, at 17 (citation omitted).) Defendants also argue that "different meanings used in the specification create uncertainty over claim scope, and the prosecution history does not provide any guidance either." (*Id.*, at 18 (citation omitted).)

Plaintiff replies that "Defendants contrive an indefiniteness argument based on a false dichotomy that the Patent discloses two different concepts: 1) 'same input data bits' (or 'input data bit') which Defendants' contend means the bit position in a data stream, and 2) 'bit value' which refers to the actual value of the bit, 0 or 1." (Dkt. No. 140, at 7.) Plaintiff submits that the District of Delaware rejected Defendants' argument. (*Id.*)

At the June 1, 2022 hearing, Defendants argued that although the specification supports two interpretations of these disputed terms, and although both interpretations are reasonable, a person of ordinary skill in the art would be unable to determine which of these two different interpretations is correct.   Defendants also argued that the construction by the District of

Delaware," construing "same bit value" to mean "value of the same bit," does not resolve this ambiguity. Plaintiff argued that Defendants are presenting a false dichotomy by attempting to distinguish between mapping a particular bit value (a "1" or a "0") and mapping a particular bit (which is at a particular position in a bit stream). Plaintiff argued that the claim language at issue simply recites that the value of a particular bit in the bit stream is modulated onto multiple carriers.

(b) Analysis

Claim 14 of the '008 Patent recites (emphasis added):

14. A multicarrier system including a first transceiver that uses a plurality of carrier signals for modulating a bit stream, wherein each carrier signal has a phase characteristic associated with the bit stream, the transceiver capable of:
    associating each carrier signal with a value determined independently of any *bit value* of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined using a pseudo-random number generator;
    computing a phase shift for each carrier signal based on the value associated with that carrier signal; and
    combining the phase shift computed for each respective carrier signal with the phase characteristic of that carrier signal to substantially scramble the phase characteristics of the plurality of carrier signals, wherein *multiple carrier signals corresponding to the scrambled carrier signals are used by the first transceiver to modulate the same bit value*.

Defendants' expert opines that "same bit value" is unclear because it could refer to *either* the bit *position* or the *value* of the bit. (*See* Dkt. No. 135, Ex. 24, Mar. 14, 2022 Zimmerman Decl. at ¶¶ 75–82.)

Plaintiff cites the opinion of its expert that persons of skill in the art would have understood that the term "same bit value" refers to the "value of the same bit." (Dkt. No. 124, Ex. 11, Mar. 2022 Madisetti Decl. at ¶¶ 57–77.)

The construction of "same bit value" as meaning "value of the same bit" is consistent with disclosures in the specification regarding reducing PAR (peak-to-average power ratio) by

scrambling, thereby mitigating or avoiding clipping and excessive power consumption. *See id.* at

¶¶ 52–61. For example, the Background of the Invention section of the specification discloses:

> If the phase of the modulated carriers is not random, then the PAR can increase
> greatly. Examples of cases where the phases of the modulated carrier signals are
> not random are when bit scramblers are not used, multiple carrier signals are used
> to modulate the same input data bits, and the constellation maps, which are
> mappings of input data bits to the phase of a carrier signal, used for modulation
> are not random enough (i.e., a zero value for a data bit corresponds to a 90 degree
> phase characteristic of the DMT carrier signal and a one value for a data bit
> corresponds to a –90 degree phase characteristic of the DMT carrier signal). An
> increased PAR can result in a system with high power consumption and/or with
> high probability of clipping the transmission signal. Thus, there remains a need
> for a system and method that can effectively scramble the phase of the modulated
> carrier signals in order to provide a low PAR for the transmission signal.

'008 Patent at 2:15–30. The specification discloses using a phase scrambler to shift the phases of

the carriers for particular bit values to reduce the PAR of the signal. *See id.* at 3:31–5:14; *see*

also Dkt. No. 124, Ex. 11, Mar. 2022 Madisetti Decl. at ¶¶ 62–70.

Plaintiff also notes disclosure regarding scrambling by using phase shifts that are

independent of the values of the input bits, such as that "[a] phase shift is computed for each

carrier signal based on [a] value associated with that carrier signal" and "[t]he value is

determined independently of any input bit value carried by that carrier signal." '008 Patent at

2:37–40 & 2:55–56; *see id.* at 4:48–63 ("The phase scrambler 66 determines each value for a

carrier signal independently of the QAM symbols 58, and, therefore, independently of the bit

value(s) modulated onto the carrier signal."); *see also id.* at 5:2–3 ("When the equation is

independent of the bit values of the input serial bit stream 54, the computed phase shifts are also

independent of such bit values."); Dkt. No. 135, Ex. 24, Mar. 14, 2022 Zimmerman Decl. at ¶ 78

("In these passages, a person of ordinary skill would understand that the specification is referring

to the value (0 or 1) of any given bit, rather than the specific position of the bit in the bit

stream.").

The District of Delaware rejected an indefiniteness argument as to related patents, namely United States Patents No. 8,073,041, 8,218,610, and 8,355,427:

> I am not persuaded by Defendants' argument that this term is indefinite because the patent is ambiguous as to the meaning of "same [input] bit value." (*Id.* at 67 (citing *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014))). In my opinion, a person of ordinary skill in the art would read the term "same [input] bit value" as "value of the same bit." As I understand it, once the phase characteristics of the carrier signals have been adjusted by the phase scrambler in the transmitting transceiver, they are then demodulated by the phase descrambler in the receiving transceiver. (*See, e.g.*, '041 patent, 4:42–46; *see also* D.I. 365 at A327–28 ¶ 63). Thus, the transmitting transceiver and the receiving transceiver are complementary. The bit values that are demodulated on the receiving side mirror the bit values that are modulated on the transmitting side. It makes sense, therefore, that the term "same [input] bit value" refers to "value of the same bit."

Delaware Family 4 CC Opinion at 10. This analysis by the District of Delaware pertained to claims that involved demodulation, and the disputed term there at issue referred to "demodulat[ing] a same [input] bit value." Defendants argued at the June 1, 2022 hearing that the claim at issue in the present case is more confusing than the claims addressed by the District of Delaware because those claims referred specifically to "the received bit stream." *Nautilus*, however, requires "reasonable certainty," not "absolute precision." 134 S. Ct. at 2129. In the present case, the claim at issue recites "a first transceiver that uses a plurality of carrier signals for modulating a bit stream," and the claim uses the term "same bit value" in relation to the recital of "bit value[s] of the bit stream" that are modulated. The term "same bit value," and the construction of that term by the District of Delaware to mean "value of the same bit," are reasonably clear in the context of the recited bit stream, such that the value of a particular bit in the bit stream is modulated onto multiple carriers. The claim scope is thus reasonably clear. The opinions of Plaintiff's expert are further persuasive in this regard. (Dkt. No. 124, Ex. 11, Mar. 2022 Madisetti Decl. at ¶ 74.)

The provisional patent application cited by Defendants does not warrant finding otherwise. (*See* Dkt. No. 135, at 17; *see also id.*, Ex. 26, United States Provisional Patent Application No. 60/164,134, at 2 (discussing that "several modulated carriers may have the same phase" if, for example: "The same data bits are used to modulate multiple carriers. This would occur in cases where it was desired (or required) to send the same data bits on different carriers and then combine the results at the receiver in order to receive the bits at a lower Bit Error Rate (this is a well-known method for using frequency diversity to decrease the BER)."). The cited portions of the provisional patent application do not refer to bit "values" and therefore do not give rise to any ambiguity regarding the meaning of the term "same bit value."

In light of all of the foregoing, the indefiniteness opinions of Defendants' expert are unpersuasive. (Dkt. No. 135, Ex. 24, Mar. 14, 2022 Zimmerman Decl. at ¶¶ 75–82.) Defendants do not meet their burden to show any lack of reasonable certainty as to the scope of these terms. *See Nautilus*, 572 U.S. at 910; *see also Sonix*, 844 F.3d at 1377. Defendants also submit that "in the Delaware litigation, *TQ Delta itself* interpreted 'same bit value' according to the first understanding described above, *i.e.*, 'same bit position,'" arguing that the "second understanding" (same value) is "unreasonably broad and would render the entire term superfluous." (Dkt. No. 135, at 18–19 (quoting *id.*, Ex. 27, Joint Claim Construction Brief, at 64).) Defendants' argument that Plaintiff's interpretation of these terms is too broad is unpersuasive in light of the above-cited analysis by the District of Delaware as well as by this Court's analysis above. Also, as a more general matter, "breadth is not indefiniteness." *BASF Corp. v. Johnson Matthey Inc.*, 875 F.3d 1360, 1367 (Fed. Cir. 2017) (quoting *SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1341 (Fed. Cir. 2005)).

Finally, because the parties have presented arguments only as to the construction of "same bit value" and not the remainder of the larger term "multiple carrier signals corresponding to the scrambled carrier signals are used by the first multicarrier transceiver to modulate the same bit value," no construction of that larger term is necessary (apart from the Court's construction of "same bit value").

The Court therefore hereby construes these disputed terms as set forth in the following chart:

Term	Construction
"same bit value"	**"value of the same bit"**
"multiple carrier signals corresponding to the scrambled carrier signals are used by the first multicarrier transceiver to modulate the same bit value"	**Plain meaning (apart from the Court's construction of "same bit value," above)**

16. "computing a phase shift for each carrier signal"

"computing a phase shift for each carrier signal" '008 Patent, Claim 14	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary.	"computing the amount by which a phase is adjusted for each carrier signal"

(Dkt. No. 107, Ex. A, at 82; *id.*, Ex. B, at 11–12; Dkt. No. 146, App'x A, at 8; Dkt. No. 149, App'x A, at 57.)

(a) The Parties' Positions

Plaintiff argues that "while the Delaware Court arrived at the construction Defendants propose, the Court addressed different issues . . . ." (Dkt. No. 124, at 19.) Plaintiff argues that

"[d]efining a 'shift' as 'the amount by which a phase is adjusted' does not help a jury beyond what the claims already recite," "[a]nd it appears that Defendants' construction calls for computing a specific 'amount' by which a phase is adjusted, while the plain language can encompass simply computing the fact that a phase shift exists." (*Id.*)

Defendants respond that determining the *existence* of a phase shift is not "computing" a phase shift. (Dkt. No. 135, at 19.)

Plaintiff replies that "[t]he claim omits the limitation 'computing the amount,' even though the specification uses the word 'amount of the phase shift' (in a different context, as described below), indicating that had the patentee intended to limit the claims to computing an amount, he could have done so." (Dkt. No. 140, at 8.)

(b) Analysis

Claim 14 of the '008 Patent recites (emphasis added):

14.   A multicarrier system including a first transceiver that uses a plurality of carrier signals for modulating a bit stream, wherein each carrier signal has a phase characteristic associated with the bit stream, the transceiver capable of:
        associating each carrier signal with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined using a pseudo-random number generator;
        computing a phase shift for each carrier signal based on the value associated with that carrier signal; and
        combining the phase shift computed for each respective carrier signal with the phase characteristic of that carrier signal to substantially scramble the phase characteristics of the plurality of carrier signals, wherein multiple carrier signals corresponding to the scrambled carrier signals are used by the first transceiver to modulate the same bit value.

In this context, interpreting "computing a phase shift for each carrier signal" as referring to the mere existence of a phase shift would be a far less natural reading than interpreting this term as referring to an amount by which a phase is adjusted. In particular, the limitation at issue refers to "computing a phase shift for each carrier signal *based on the value* associated with that

carrier signal," and Plaintiff does *not* persuasive show how "computing" a phase shift "based on" a "value" could encompass determining merely whether a phase shift exists or not.

> This is also consistent with disclosure in the specification:

> The DMT transmitter 22 then *computes* (step 115) the phase shift that is used to adjust the phase characteristic of each carrier signal. The *amount* of the phase shift combined with the phase characteristic of each QAM-modulated carrier signal depends upon the equation used and the one or more values associated with that carrier signal.

'008 Patent at 6:41–46 (emphasis added). Plaintiff argues that this disclosure of an "amount" does not warrant interpreting "computing" to *require* determining an amount, Plaintiff arguing that "[t]his indicates that the amount of the phase shift depends on the equation used, not that the system must compute the amount." (Dkt. No. 140, at 8.) A fair reading of this disclosure, however, is that "computes" in the first sentence gives rise to the "amount" in the second sentence. *See* '008 Patent at 6:41–46; *see also id.* at 4:64–5:4 ("The phase scrambler 66 then solves a predetermined equation to compute a phase shift for the carrier signal . . . .") & 9:16–28 ("Because the generation of phase shifts in this embodiment is based on values that vary over time, the phase shifts computed for the subsequent DMT symbol 70' are different than those that were previously computed for the DMT symbol 70 with the clipped time domain sample.").

This interpretation of the claim language is also consistent with the construction reached by the District of Delaware for the same term in the same claim, wherein the court rejected Plaintiff's proposal of a plain and ordinary meaning construction and instead construed "computing a phase shift for each carrier signal" to mean "computing the amount by which a phase is adjusted for each carrier signal," which is the construction that Defendants propose in the present case. *Delaware Family 4 CC Opinion* at 17–18. The District of Delaware construed

the constituent term "phase shift" to mean "the amount by which a phase is adjusted," Plaintiff

there having proposed "the amount by which a phase is (or will be) shifted." *Id.* at 12–14.

Plaintiff argues that the District of Delaware "addressed different issues (whether a phase

shift was the '*angle* by which the phase . . . is *rotated*' and whether it was necessary to expressly

include in the construction retrospective, contemporaneous, and prospective phase shifts)." (Dkt.

No. 124, at 19–20.) In light of the foregoing, Plaintiff does not persuasively justify departing

from the construction reached by the District of Delaware, particularly as to Plaintiff's

suggestion that this term could encompass determining the mere existence of a phase shift.

The Court therefore hereby construes **"computing a phase shift for each carrier**

signal" to mean **"computing the amount by which a phase is adjusted for each carrier**

signal."

**17. "combining the phase shift computed for each respective carrier signal with the phase
characteristic of that carrier signal"**

"combining the phase shift computed for each respective carrier signal with the phase characteristic of that carrier signal" ’008 Patent, Claim 14	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary.	"adjusting the phase of each carrier signal by an amount computed for that carrier signal"

(Dkt. No. 107, Ex. A, at 83; Dkt. No. 146, App'x A, at 8; Dkt. No. 149, App'x A, at 58.)

(a) The Parties' Positions

Plaintiff argues that while "[i]t is true that the Delaware Court entered the Defendants'

proposed construction (which was agreed to)," "Defendants' proposed construction largely

copies over its 'phase shift' proposal and may be read to overly limit this term for the same reasons." (Dkt. No. 124, at 20 (citation omitted).)

Defendants respond by incorporating their arguments as to the term "computing a phase shift for each carrier signal," which is discussed above. (Dkt. No. 135, at 19–20.) Plaintiff replies likewise. (*See* Dkt. No. 140, at 7–8.)

(b) Analysis

Claim 14 of the '008 Patent recites (emphasis added):

14. A multicarrier system including a first transceiver that uses a plurality of carrier signals for modulating a bit stream, wherein each carrier signal has a phase characteristic associated with the bit stream, the transceiver capable of:
  associating each carrier signal with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined using a pseudo-random number generator;
  computing a phase shift for each carrier signal based on the value associated with that carrier signal; and
  combining the phase shift computed for each respective carrier signal with the phase characteristic of that carrier signal to substantially scramble the phase characteristics of the plurality of carrier signals, wherein multiple carrier signals corresponding to the scrambled carrier signals are used by the first transceiver to modulate the same bit value.

This term presents substantially the same dispute as the term "computing a phase shift for each carrier signal," which is discussed above, and for essentially the same reasons the Court expressly rejects Plaintiff's argument that "the phase shift computed for each respective carrier signal" could refer to merely the existence of a phase shift.

Defendants' proposal, however, would tend to confuse rather than clarify the scope of the disputed term. Instead, this dispute is already adequately addressed by the Court's construction of "computing a phase shift for each carrier signal," above. No further construction is necessary. *See U.S. Surgical*, 103 F.3d at 1568; *see also O2 Micro*, 521 F.3d at 1362; *Finjan*, 626 F.3d at 1207; *ActiveVideo*, 694 F.3d at 1326; *Summit 6*, 802 F.3d at 1291; *Bayer*, 989 F.3d at 977–79.

The Court therefore hereby construes **"combining the phase shift computed for each respective carrier signal with the phase characteristic of that carrier signal"** to have its **plain meaning.**

IX. DISPUTED TERMS IN THE "FAMILY 6" PATENTS

Plaintiff submits that "[t]he Family 6 Patents generally relate to techniques to adapt noise protection to changing conditions while continuing to communicate data." (Dkt. No. 124, at 1 (citation omitted).)

The '835 Patent, for example, titled "Impulse Noise Management," issued on June 11, 2013, and bears an earliest priority date of March 3, 2004. The Abstract of the '835 Patent states:

> Evaluation of the impact of impulse noise on a communication system can be utilized to determine how the system should be configured to adapt to impulse noise events. Moreover, the system allows for information regarding impulse noise events, such as length of the event, repetition period of the event and timing of the event, to be collected and forwarded to a destination. The adaptation can be performed during one or more of Showtime and initialization, and can be initiated and determined at either one or more of a transmitter and a receiver.

18. "steady-state communication"

"steady-state communication" '835 Patent, Claim 8 '112 Patent, Claim 8	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
"Showtime"	"the state of the transceiver reached after all initialization and training is completed in which user data is transmitted or received"

(Dkt. No. 107, Ex. A, at 85; *id.*, Ex. B, at 14–15; Dkt. No. 146, App'x A, at 8; Dkt. No. 149, App'x A, at 59.)

(a) The Parties' Positions

Plaintiff argues that whereas "Defendants' proposal is what the parties agreed to in Delaware," Plaintiff's proposal "matches the specification's definition." (Dkt. No. 124, at 20–21 (citation omitted).)

Defendants respond that "Defendants' proposed construction is consistent with the plain and ordinary meaning of the term 'steady-state communication,' while TQ Delta's construction limits the term to an example embodiment in the specification." (Dkt. No. 135, at 20 (citations omitted).) Defendants argue that "the specification explains that 'steady-state communication' may be consistent with 'Showtime' *for DSL technologies*, but the claims are not limited to DSL technologies." (*Id.*)

Plaintiff replies that "[i]n five places, the Patents define a steady-state communication as "Showtime," and "[t]he term 'Showtime' appears over 50 times, reinforcing that the Family 6 Patents are about xDSL systems." (Dkt. No. 140, at 8 (citing '348 Patent at 2:43–49, 4:3–7, 4:25–31, 8:25–27 & 9:40–43).)

(b) Analysis

Claim 8 of the '835 Patent, for example, recites (emphasis added):

8. An apparatus configurable to adapt forward error correction and interleaver parameter (FIP) settings during *steady-state communication* or initialization comprising:

    a transceiver, including a processor, configurable to:
        transmit a signal using a first FIP setting,
        transmit a flag signal, and
        switch to using for transmission, a second FIP setting
            following transmission of the flag signal,
    wherein:
        the first FIP setting comprises at least one first FIP value,
        the second FIP setting comprises at least one second FIP
            value, different than the first FIP value, and

> the switching occurs on a pre-defined forward error correction codeword boundary following the flag signal.

The specification discloses:

> The current technique includes the steps of an operator, or service provider, configuring the ADSL connection with a specific noise protection value, the ADSL connection is initialized and the transceivers enter into steady state data transmission (i.e., Showtime), and if the connection is stable, i.e., error-free, then the service is acceptable and the process ends.
>
> * * *
>
> The process of determining the impact of impulse noise by transmitting and receiving using a plurality of FIP settings can be done while in steady-state transmission, i.e., Showtime for DSL systems, when user information bits are being transmitted.

'835 Patent at 2:42–49 & 4:3–7; *see id.* at 4:25–31 ("steady-state transmission during which user information is transmitted is known as 'Showtime' in XDSL systems"), 8:25–27 ("regular, i.e., Showtime, operation") & 9:40–43 ("regular steady-state transmission, i.e., Showtime in ADSL").

In general, "the usage 'i.e.' ('id est' or 'that is'), 'signals an intent to define the word to which it refers.'" *TF3 Ltd. v. Tre Milano, LLC*, 894 F.3d 1366, 1372 (Fed. Cir. 2018) (quoting *Edwards Lifesciences LLC v. Cook Inc.*, 582 F.3d 1322, 1334 (Fed. Cir. 2009)); *see TF3*, 894 F.3d at 1372 ("'i.e.' is definitional when it 'comports with the inventors' other uses . . . in the specification and with each and every other reference") (quoting *SkinMedica, Inc. v. Histogen Inc.*, 727 F.3d 1187, 1202 (Fed. Cir. 2013)).

Here, however, several of the above-cited disclosures imply that "DSL systems" are an example rather than a necessary limitation. *See* '835 Patent at 4:3–7 ("i.e., Showtime *for DSL systems*"); *see also id.* at 4:25–31 & 9:40–43 (quoted above). Thus, despite the patentee's use of "i.e.," the patentee did not clearly define the disputed claim term as meaning "Showtime." *See CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002) ("[T]he claim term

will not receive its ordinary meaning if the patentee acted as his own lexicographer and *clearly* set forth a definition of the disputed claim term in either the specification or prosecution history.") (citation omitted; emphasis added). Plaintiff does not otherwise persuasively show that the claims here at issue are limited to DSL.

Also of note, the construction proposed by Defendants is a construction that Plaintiff agreed to in the District of Delaware. *See TQ Delta, LLC v. ADTRAN, Inc.*, No. 1:14-CV-00954-RGA (D. Del.), Dkt. No. 183, Aug. 23, 2017 Joint Claim Construction Chart, at 6. The construction agreed upon in that case is also consistent with disclosure in the specification, such as that "*steady-state transmission during which user information is transmitted* is known as 'Showtime' in XDSL systems" and "standard ITU G.992.3 ADSL systems and ITU VDSL G.993.3 systems include an exchange phase in initialization during which the Showtime parameters are exchanged." '835 Patent at 4:19–31 (emphasis added).

The Court therefore hereby construes **"steady-state communication"** to mean **"the state of the transceiver reached after all initialization and training is completed in which user data is transmitted or received."**

19. "FIP setting"

20. "FIP value"

"FIP setting" '835 Patent, Claims 8, 10, 26; '112 Patent, Claim 8	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary.	"forward error correction and interleaver parameters characterized by the set of parameters for codeword size in bytes, number of information bytes in a codeword, number of parity or redundancy bytes in a codeword, and interleaver depth in number of codewords"
"FIP value" '835 Patent, Claim 8	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary.	"numerical value of codeword size in bytes, number of information bytes in a codeword, number of parity or redundancy bytes in a codeword, or interleaver depth in number of codewords"

(Dkt. No. 107, Ex. A, at 87 & 89; *id.*, Ex. B, at 13; Dkt. No. 146, App'x A, at 8–9; Dkt. No. 149, App'x A, at 61 & 63.)

(a) The Parties' Positions

Plaintiff argues that "Defendants propose a construction for these terms that the Delaware Court correctly rejected." (Dkt. No. 124, at 23.) Plaintiff submits that "'FIP' is an acronym for 'Forward Error Correction and Interleaving,'" and "[a] FIP setting (or value) simply refers to forward error correction and interleaver parameters (or values)." (*Id.*)

Defendants respond that "[b]ecause the Family 6 Patents define 'FIP Settings' as the N, K, R, and D parameters with particular definitions in the specification, the Court should construe the term consistent with Defendants' proposed construction." (Dkt. No. 135, at 22.) Defendants also argue: "TQ Delta provides no justification for its plain-and-ordinary-meaning construction beyond citing the Delaware court's opinion on this term. That court incorrectly held that an extrinsic standard referenced in the Family 6 Patents shows that the FIP Settings may comprise additional parameters other than the N, K, R, and D parameters." (*Id.*, at 23 (citation omitted).)

Plaintiff replies: "Defendants ignore the provisional application's disclosure of 'FIP settings' and 'FIP values'—which includes parameters besides the four that Defendants limit this term to. Opening Br. at 22–24. That disclosure shows that Defendants' construction is wrong. The remainder of Defendants' arguments were rejected by the Delaware Court (*e.g.*, that measuring interleaver depth is not limited to 'codeword size'), holdings that Defendants do not substantively address." (Dkt. No. 140, at 9.)

(b) Analysis

Claim 8 of the '835 Patent, for example, recites (emphasis added):

8. An apparatus configurable to adapt *forward error correction and interleaver parameter (FIP) settings* during steady-state communication or initialization comprising:
      a transceiver, including a processor, configurable to:
            transmit a signal using a first *FIP setting*,
            transmit a flag signal, and
            switch to using for transmission, a second *FIP setting*
                following transmission of the flag signal,
      wherein:
            the first *FIP setting* comprises at least one first *FIP value*,
            the second *FIP setting* comprises at least one second *FIP value*, different than the first *FIP value*, and
            the switching occurs on a pre-defined forward error correction codeword boundary following the flag signal.

The parties agree that "FIP" is an acronym for "forward error correction and interleaver parameter," which is apparent on the face of above-reproduced Claim 8. *See also* '835 Patent at 3:31–34 ("FEC and Interleaving Parameter (FIP) setting").

Defendants propose a construction for "FIP setting" that the District of Delaware rejected, finding that whereas "Defendants improperly limit 'FIP setting' to exactly four parameters, and only those parameters," "[a] 'FIP setting' may include other parameters." *Delaware Family 6 CC Opinion* at 12. The Delaware court adopted the construction proposed by Plaintiff in that case, namely "set including at least one forward error correction parameter value and at least one interleaver parameter value." *Id.* at 11–12. The Delaware court similarly adopted Plaintiff's proposal to construe "FIP value" to mean "numerical value of a forward error correction parameter or numerical value of an interleaver parameter." *Id.* at 12–13.

Defendants argue that the terms "FIP setting" and "FIP value" have *not* been known terms of art outside of the Family 6 Patents. For example, Defendants' expert opines: "While a person of ordinary skill in the art would have generally understood that the processes of forward error correction encoding and interleaving are usually governed by certain parameters, a person of ordinary skill in the art would have been unfamiliar with the particular initialism 'FIP' as used in the Family 6 Patents." (*See* Dkt. No. 135, Ex. 23, Mar. 14, 2022 McNair Decl., at ¶ 58.) Defendants argue that the meanings of these terms should be limited to the parameters disclosed for these terms in the specification. (*See id.* at ¶ 59; *see also* '835 Patent at 1:65–2:20.)

As a general matter, in some cases, a term that has no well-established meaning "cannot be construed broader than the disclosure in the specification." *Indacon, Inc. v. Facebook, Inc.*, 824 F.3d 1352, 1357 (Fed. Cir. 2016); *see Intervet, Inc. v. Merial Ltd.*, 617 F.3d 1282, 1287 (Fed. Cir. 2010) ("Idiosyncratic language, highly technical terms, or terms coined by the inventor

are best understood by reference to the specification.") (citing *Phillips*, 415 F.3d at 1315); *see also Irdeto Access, Inc. v. EchoStar Satellite Corp.*, 383 F.3d 1295, 1300 (Fed. Cir. 2004) ("absent . . . an accepted meaning [in the art], we construe a claim term only as broadly as provided for by the patent itself").

Here, however, Defendants acknowledge that forward error correction and interleaving were known concepts at the time of the claimed inventions. (*See* Dkt. No. 135, Ex. 23, Mar. 14, 2022 McNair Decl., at ¶ 58.) The patentee's use of the acronym "FIP" did not erase what a person of ordinary skill in the art at the relevant time would have known about parameters for forward error correction and interleaving.

The Court therefore reaches the same conclusions and constructions as the District of Delaware for these terms, and the Court accordingly hereby construes these disputed terms as set forth in the following chart:

Term	Construction
"FIP setting"	**"set including at least one forward error correction parameter value and at least one interleaver parameter value"**
"FIP value"	**"numerical value of a forward error correction parameter or numerical value of an interleaver parameter"**

21. "flag signal"

"flag signal" '835 Patent, Claim 8 '162 Patent, Claims 8, 9	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
"signal used to indicate when an updated FIP setting / interleaver parameter value is to be used (the signal does not contain message data indicating when the updated FIP setting / interleaver parameter value is to be used)"	"signal used to indicate when updated FIP settings / interleaver parameter values are to be used"

(Dkt. No. 107, Ex. A, at 90–91; *id.*, Ex. B, at 14; Dkt. No. 146, App'x A, at 9; Dkt. No. 149, App'x A, at 64.)

(a) The Parties' Positions

Plaintiff submits that "[b]oth parties propose the same affirmative construction," and "TQ Delta does not believe there is a claim-scope dispute between the parties on this term." (Dkt. No. 124, at 21.) Plaintiff also submits that "[t]he parenthetical that TQ Delta proposes was agreed-to in the Delaware case" and "clarifies what the affirmative construction already states— that a flag signal is different than message data, a distinction reflected in the intrinsic record." (*Id.* (citations omitted).)

Defendants respond that "TQ Delta's construction adds a negative limitation that finds no support in the specification." (Dkt. No. 135, at 21.)

Plaintiff responds: "Defendants do not identify a claim-scope dispute with TQ Delta's proposed construction, which was agreed-to in Delaware. A flag signal, as the Patents teach (Opening Br. at 21), is different than message data, which Defendants do not meaningfully contest." (*Id.*, at 8–9.)

In a supplemental brief permitted by leave of Court (*see* Dkt. Nos. 159), Defendants submit Preliminary Responses filed by Plaintiff on May 25, 2022, in *Inter Partes* Review ("IPR") proceedings being conducted by the Patent Trial and Appeal Board ("PTAB") regarding the '835 Patent. (*See* Dkt. No. 157.) Defendants argue that Plaintiff, in these Preliminary Responses, argues that the construction by the District of Delaware was wrong and also proposes a parenthetical that is different than what Plaintiff proposes for the construction in the present case. (*See id.*, at 1.) Defendants argue that "TQ Delta appears to be strategically taking different positions in district court and before the PTAB to try to preserve the validity of the '835 patent over the prior art." (*Id.*, at 2.)

(b) Analysis

Claim 8 of the '835 Patent, for example, recites (emphasis added):

8. An apparatus configurable to adapt forward error correction and interleaver parameter (FIP) settings during steady-state communication or initialization comprising:
    a transceiver, including a processor, configurable to:
        transmit a signal using a first FIP setting,
        transmit a *flag signal*, and
        switch to using for transmission, a second FIP setting
            following transmission of the *flag signal*,
    wherein:
        the first FIP setting comprises at least one first FIP value,
        the second FIP setting comprises at least one second FIP
            value, different than the first FIP value, and
        the switching occurs on a pre-defined forward error
            correction codeword boundary following the *flag
            signal*.

The District of Delaware adopted a parenthetical that appeared in "compromise constructions" submitted by each side in that case. *See Delaware Family 6 CC Opinion* at 4. That is, each side proposed a main construction and a compromise construction, and although the compromise constructions differed from one another, both compromise constructions included

nearly the same parenthetical (defendant's proposed parenthetical referred to a "FEC codeword counter value" and Plaintiff's proposed parenthetical referred to a "FEC codeword counter," without the word "value"). *Id.*

The District of Delaware adopted the proposal by the defendants in that case, such that the District of Delaware construed "flag signal" to mean "signal used to indicate when an updated FIP setting is to be used (the signal does not include the FEC codeword counter value upon which the updated FIP setting is to be used)." *Id.* at 5; *see id.* at 4–6.

Plaintiff proposes a parenthetical different from the one adopted by the District of Delaware, and Plaintiff cites disclosure in the specification:

> FIG. 6 illustrates an exemplary method of synchronization using a flag signal according to this invention. In particular, control begins in step S600 and continues to step S610. In step S610, the modems enter Showtime using the first FIP parameters. Next, in step S620, a message is exchanged indicating the new FIP settings. Then, in step S630, the transmitter forwards to the receiver a *flag signal* indicating when the new FIP settings are to be used.
>
> At step S640, and *at a predefined change time following the transmission of the flag signal*, the transmitter begins transmission using the new FIP parameters. Next, at step S650, at the *predefined change time following the reception of the flag signal*, the receiver commences reception utilizing the new FIP parameters. Control then continues to step S660 where Showtime communication continues with the control sequence ending at step S670.

'835 Patent at 19:14–30.

The disclosure thus explains that, in this embodiment, the "flag signal" does not itself specify a time but rather there is a "predefined change time following the transmission of the flag signal." *Id.* In other words, a "flag signal" is a signal *to* change, not a signal of *when* to change. Other disclosure in the specification is similar in this regard. *See id.* at 11:66–12:24 ("For synchronization using a flag signal, the receiver and transmitter would start using updated FEC and interleaving parameters on a pre-defined FEC codeword boundary following the sync flag.").

Construing the term "flag signal" in light of this disclosure in the specification does not improperly limit the term to a particular embodiment because the surrounding claim language, such as in above-reproduced Claim 8 of the '835 Patent, recites that "the switching occurs on a *pre-defined* forward error correction codeword boundary *following the flag signal*." This usage of "pre-defined" and "following" demonstrates that a "flag signal" does not itself set forth a change time but rather is merely an indication that the updated FIP setting / interleaver parameter value should be used at some juncture that is pre-defined in relation to when the flag signal is received. The specification contrasts this with other synchronization methods, such as using codeword counters. *See id.* at 8:67–9:2 (. . . at a synchronized point in time"), 9:23–27 ("this transition can be synchronized using a number of different exemplary methods"), 11:10–65 ("counting the FEC codewords from the beginning of Showtime and the transition would occur when a specific FEC codeword counter value that is known by both the transmitter 300 and the receiver 200 is reached") & 18:61–19:10 ("a message with the FEC codeword counter value on which the new FIP values are to be used is exchanged" and "a determination is made whether the counter value has been reached").

Finally, as to Defendants' supplemental submission of IPR Preliminary Responses that Plaintiff filed with the PTAB, those Preliminary Responses set forth a proposal by Plaintiff to construe "flag signal" to mean "signal used to indicate when an updated FIP setting is to be used, where the signal does not include information (*e.g.*, a FEC codeword counter value) specifying when the updated FIP setting is to be used." (Dkt. No. 157, Ex. 37, May 25, 2022 Patent Owner's Preliminary Response, at 9; *see id.* at 5–9; *see also id.*, Ex. 38, May 25, 2022 Patent Owner's Preliminary Response, at 6–9.) These Preliminary Responses do not affect the Court's analysis, particularly given that Plaintiff states in these Preliminary Responses that the

parenthetical set forth by the District of Delaware in its claim construction is "accurate" (albeit, Plaintiff argues, "incomplete"). For the reasons set forth above, the Court adopts the District of Delaware construction rather than the construction proposed by Plaintiff in the present case, so Defendants' reliance on the Preliminary Responses to undermine Plaintiff's proposal, even if found persuasive, would be of no significant effect. Plaintiff's arguments in the Preliminary Responses also present nothing that would warrant abandoning the parenthetical adopted by the District of Delaware that the Court here, too, finds appropriate to make clear that a "flag signal" does not include a counter value upon which an updated FIP setting will be used, as discussed above.

The Court therefore hereby construes **"flag signal"** to mean **"signal used to indicate when an updated FIP setting is to be used (the signal does not include the FEC codeword counter value upon which the updated FIP setting is to be used)."**

22. "interleaver parameter value"

"interleaver parameter value" '835 Patent, Claims 10, 26; '162 Patent, Claim 8	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary.	"the numerical value of the interleaver depth in number of codewords"

(Dkt. No. 107, Ex. A, at 93; *id.*, Ex. B, at 14; Dkt. No. 146, App'x A, at 9; Dkt. No. 149, App'x A, at 65.)

(a) The Parties' Positions

Plaintiff argues:

The plain-and-ordinary meaning of this term references the interleaver depth, which is a value that can be expressed in multiple ways, such as bits, bytes, or codewords (just like distance can be expressed in inches, feet, and yards). Defendants' proposal improperly limits the term to *one* way to express that depth: "in number of codewords." This improperly limits the claims to one disclosed example. And the Delaware Court rejected the same attempt to improperly limit the claims.

(Dkt. No. 124, at 22 (citation omitted).)

Defendants respond that "similar to 'FIP Setting,' 'interleaver parameter value' was not a term of art at the time of the alleged invention and did not have a generally understood meaning," so "a POSITA [(person of ordinary skill in the art)] would have looked to the specification of the Family 6 Patents to understand the term 'interleaver parameter value,' which defines the term as 'interleaver depth in number of codewords.'" (Dkt. No. 135, at 23 (citations omitted).)

Plaintiff replies as to this term together with its reply as to "FIP setting" and "FIP value," which are addressed above. (Dkt. No. 140, at 9.)

(b) Analysis

Claim 10 of the '835 Patent, for example, recites (emphasis added):

10. The apparatus of claim 8, wherein a first *interleaver parameter value* of the first FIP setting is different than a second *interleaver parameter value* of the second FIP setting.

The District of Delaware rejected a proposal by the defendants in that case to construe this disputed term to mean "the numerical value of the interleaver depth in number of codewords." *Delaware Family 6 CC Opinion* at 7. The District of Delaware found that "[b]ecause 'interleaver depth' can be measured using a unit other than 'number of codewords,' the specification's reference to measuring 'interleaver depth' 'in number of codewords' must be a mere embodiment." *Id.* at 8; *see id.* at 8–9.

The District of Delaware construed "interleaver parameter value" to mean "numerical value of the interleaver depth." *Id.* at 7; *see id.* at 7–11.

Defendants argue that their proposal of "number of codewords" is based on a definition of the term "interleaver parameter value" in the specification, but a lexicography must be clear, and the disclosures cited by Defendants relate to specific embodiments and do not purport to define the term "interleaver parameter value" in general. *See* '162 Patent at 2:10–22, 3:33–49 & 13:43–47; *see also CCS Fitness*, 288 F.3d at 1366 ("[T]he claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer and *clearly* set forth a definition of the disputed claim term in either the specification or prosecution history.") (citation omitted; emphasis added).

The opinions of Defendants' expert do not compel otherwise. (*See* Dkt. No. 135, Ex. 23, Mar. 14, 2022 McNair Decl., at ¶¶ 58–61.) In particular, Defendants' expert opines that "[w]hile a person of ordinary skill in the art would have generally understood that the processes of forward error correction encoding and interleaving are usually governed by certain parameters, a person of ordinary skill in the art would have been unfamiliar with the particular initialism 'FIP' as used in the Family 6 Patents," and "[b]ecause the Family 6 Patents specially define the term 'FIP,' a person of ordinary skill in the art would have understood the Family 6 Patents to be referring to particular FEC and interleaving parameters as explained in the Family 6 Patents." (*Id.*, at ¶ 58.) The patentee's use of the acronym "FIP" did not erase what a person of ordinary skill in the art at the relevant time would have known about parameters for interleaving and, as noted above, the patentee did not set forth any clear lexicography.

Thus, Defendants do not persuasively justify limiting the construction to "number of codewords" or otherwise departing from the Delaware construction.

The Court therefore hereby construes **"interleaver parameter value"** to mean **"numerical value of the interleaver depth."**

X. DISPUTED TERMS IN THE "FAMILY 9" PATENTS

Plaintiff submits that "[t]he Family 3 and 9 Patents generally relate to sharing resources, such as sharing memory between an interleaver and deinterleaver or a transmission function and a retransmission function." (Dkt. No. 124, at 1 (citation omitted).)

The '348 Patent, for example, titled "Packet Retransmission," issued on July 28, 2015, and bears an earliest priority date of April 12, 2006. The Abstract of the '348 Patent states:

> Through the identification of different packet-types, packets can be handled based on an assigned packet handling identifier. This identifier can, for example, enable forwarding of latency-sensitive packets without delay and allow error-sensitive packets to be stored for possible retransmission. In another embodiment, and optionally in conjunction with retransmission protocols including a packet handling identifier, a memory used for retransmission of packets can be shared with other transceiver functionality such as, coding, decoding, interleaving, deinterleaving, error correction, and the like.

As to the term "receive at least one message without using interleaving" in Claims 37 and 53 of the '577 Patent, Plaintiff states in its Reply Claim Construction Brief that "TQ Delta omitted the claims in which this term appears from its Preliminary Election of Asserted Claims. TQ Delta thus submits that the Court need not address this term." (Dkt. No. 140, at 9.) Because Plaintiff no longer asserts the claims in which this term appears, the Court does not further address this term.

Also, the term "memory has been allocated" ('411 Patent, Claim 10) appears in Defendant's portion of the Joint Claim Construction and Prehearing Statement, but this term is not addressed in the parties' briefing. The Court therefore does not further address this term.

23. "higher immunity to noise"

<table>
<tr><td colspan="2" align="center">"higher immunity to noise"
'348 Patent, Claim 2</td></tr>
<tr><td>Plaintiff's Proposed Construction</td><td>Defendants' Proposed Construction</td></tr>
<tr><td>"higher SNR margin"</td><td>Plain and ordinary meaning</td></tr>
</table>

(Dkt. No. 107, Ex. A, at 95; *id.*, Ex. B, at 16; Dkt. No. 146, App'x A, at 9; Dkt. No. 149, App'x A, at 66.)

(a) The Parties' Positions

Plaintiff argues that "[t]he Court should construe this term to help the jury understand the claims," and "[t]he Patents explain that messages have 'higher immunity to noise' than a packet because they have a higher signal-to-noise (known as 'SNR') margin (which reflects the margin between the strength of the signal and the noise, typically expressed in decibels (dB))." (Dkt. No. 124, at 24 (citing '348 Patent at 16:4–9).)

Defendants respond that "TQ Delta provides no reason why the term should be limited to just one example (among several) referenced in the specification." (Dkt. No. 135, at 25 (citation omitted).)

Plaintiff replies that "[t]he only part of the Patents that mention messages that have a higher immunity to noise ties it to a higher SNR margin." (Dkt. No. 140, at 9 (citing '348 Patent at 16:4–9).) Plaintiff argues that "[w]hile Defendants note that this disclosure is an 'alternative[]' ('or in addition') embodiment, the claims are dependent claims drawn to that embodiment," "[a]nd Defendants' cited portions do not refer to a message having a higher immunity to noise (they mention 'robustness,' including by sending the same message multiple times)." (*Id.*, at 9.)

(b) Analysis

Claims 1, 2, 9, and 10 of the '348 Patent, for example, recite (emphasis added):

1. An apparatus comprising:
       a multicarrier transceiver including a processor and memory operable to:
       transmit a packet using a forward error correction encoder and an interleaver, wherein the packet comprises a header field and a plurality of PTM-TC codewords, a plurality of ATM cells or a plurality of Reed-Solomon codewords, and wherein the header field comprises a sequence identifier (SID); and
       receive a plurality of messages using a forward error correction decoder and without using a deinterleaver, wherein each message of the plurality of messages is received in a different DMT symbol and wherein at least one message of the plurality of messages includes an acknowledgement (ACK) or a negative acknowledgement (NACK) of the transmitted packet.

2. The apparatus of claim 1, wherein the received messages have a *higher immunity to noise* than the transmitted packet.

* * *

9. An apparatus comprising:
       a multicarrier transceiver including a processor and memory operable to:
       receive a packet using a forward error correction decoder and a deinterleaver, wherein the packet comprises a header field and a plurality of PTM-TC codewords, a plurality of ATM cells or a plurality of Reed-Solomon codewords, and wherein the header field comprises a sequence identifier (SID); and
       transmit a plurality of messages using a forward error correction encoder and without using an interleaver, wherein each message of the plurality of messages is transmitted in a different DMT symbol and wherein at least one message of the plurality of messages includes an acknowledgement (ACK) or a negative acknowledgement (NACK) of the received packet.

10. The apparatus of claim 9, wherein the transmitted messages have a *higher immunity to noise* than the received packet.

The specification discloses:

Alternatively, or in addition, the DMT sub-carriers that modulate these messages could operate with a much *higher SNR margin* e.g., 15 dB, as compared to the normal 6 dB margin of xDSL systems. This way, the messages would have a *higher immunity to channel noise*.

'348 Patent at 16:4–9 (emphasis added).

The specification thus discloses that having a "higher SNR margin" (which is the construction proposed by Plaintiff) is *a manner in which* "higher immunity to noise" can be achieved. This does not mean that having "higher immunity to noise" necessary involves a higher SNR margin. For example, the specification also discloses that "messages can be sent with increasing robustness by repeating transmission of each message a number of times." *Id.* at 15:33–35. Plaintiff's proposal would improperly limit the disputed term to a specific feature of a particular disclosed embodiment and should be rejected. *See Phillips*, 415 F.3d at 1323.

The Court therefore hereby expressly rejects Plaintiff's proposed construction, and no further construction is necessary. *See U.S. Surgical*, 103 F.3d at 1568; *see also O2 Micro*, 521 F.3d at 1362; *Finjan*, 626 F.3d at 1207; *ActiveVideo*, 694 F.3d at 1326; *Summit 6*, 802 F.3d at 1291; *Bayer*, 989 F.3d at 977–79.

The Court accordingly hereby construes **"higher immunity to noise"** to have its **plain meaning**.

24. "PTM-TC [(Packet Transfer Mode Transmission Convergence)] codewords"

"PTM-TC [(Packet Transfer Mode Transmission Convergence)] codewords" '577 Patent, Claims 17, 37 '348 Patent, Claims 1, 9 '055 Patent, Claim 17	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary	(None)

(Dkt. No. 107, Ex. A, at 96.)

Plaintiff submits: "TQ Delta also proposed '[p]lain and ordinary meaning. No construction necessary' for the term 'PTM-TC [(Packet Transfer Mode Transmission

Convergence)] codewords' found in claims 17 and 37 of the '577 Patent, claims 1 and 9 of the '348 Patent, and claim 17 of the '055 Patent. Dkt. 107-1, at 96. Defendants did not propose a construction for this term. *See generally* Dkt. 107-2." (Dkt. No. 124, at 2 n.1.)

Defendants have not proposed a construction for this term and have not addressed this term in their responsive claim construction brief. At the June 1, 2022 hearing, the parties confirmed that this term is no longer in dispute, and Defendants agreed that this term has its plain and ordinary meaning.

The Court therefore hereby construes **"PTM-TC [(Packet Transfer Mode Transmission Convergence)] codewords"** to have its **plain meaning**.

25. **"receive at least one packet using deinterleaving"**

26. **"[transmit/retransmit] at least one packet using interleaving"**

27. **"[transmit/receive] a [packet/plurality of messages] using a forward error correction [encoder/decoder] and [without using] [an/a interleaver/deinterleaver]"**

28. **"transmitting, by the transceiver, a packet using a forward error correction encoder and an interleaver"**

29. **"receiving, by the transceiver, at least one message using a forward error correction decoder and without using a deinterleaver"**

30. **"[transmitting/transmit/receiving/receive] a [packet/message] using forward error correction [encoding/decoding] and [without using] [interleaving/deinterleaving]"**

31. **"[retransmit/retransmitting] the packet using [the] forward error correction [encoder/encoding] and [the interleaver/interleaving]"**

32. **"[receive/receiving] a retransmitted packet using [the] forward error correction [decoder/decoding] and [the deinterleaver/deinterleaving]"**

"receive at least one packet using deinterleaving"
'577 Patent, Claim 16

"[transmit/retransmit] at least one packet using interleaving"
'577 Patent, Claims 37, 38, 53, 54

"[transmit/receive] a [packet/plurality of messages] using a forward error correction [encoder/decoder] and [without using] [an/a interleaver/deinterleaver]" '348 Patent, Claims 1, 9 "transmitting, by the transceiver, a packet using a forward error correction encoder and an interleaver" '4473 Patent, Claim 1 "receiving, by the transceiver, at least one message using a forward error correction decoder and without using a deinterleaver" '4473 Patent, Claim 1 "[transmitting/transmit/receiving/receive] a [packet/message] using forward error correction [encoding/decoding] and [without using] [interleaving/deinterleaving]" '809 Patent, Claim 8 "[retransmit/retransmitting] the packet using [the] forward error correction [encoder/encoding] and [the interleaver/interleaving]" '348 Patent, Claim 3 '4473 Patent, Claim 3 '809 Patent, Claims 3, 17 "[receive/receiving] a retransmitted packet using [the] forward error correction [decoder/decoding] and [the deinterleaver/deinterleaving]" '348 Patent, Claim 11 '809 Patent, Claim 10	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary.	Indefinite

(Dkt. No. 107, Ex. A, at 98–107; *id.*, Ex. B, at 16; Dkt. No. 124, at 25 n.21; Dkt. No. 146, App'x A, at 10; Dkt. No. 149, App'x A, at 67; Dkt. No. 149, App'x A, at 67–69.)

The following terms do not appear in the parties' P.R. 4-5(d) Joint Claim Construction Chart (*see* Dkt. No. 149, App'x A): "[transmit/retransmit] at least one packet using interleaving" ('577 Patent, Claims 37, 38, 53, 54); "transmitting, by the transceiver, a packet using a forward error correction encoder and an interleaver" ('4473 Patent, Claim 1); "receiving, by the transceiver, at least one message using a forward error correction decoder and without using a

deinterleaver" ('4473 Patent, Claim 1); "[retransmit/retransmitting] the packet using [the] forward error correction [encoder/encoding] and [the interleaver/interleaving]" ('348 Patent, Claim 3; '4473 Patent, Claim 3; '809 Patent, Claims 3, 17); and "[receive/receiving] a retransmitted packet using [the] forward error correction [decoder/decoding] and [the deinterleaver/deinterleaving]" ('348 Patent, Claim 11; '809 Patent, Claim 10). The analysis set forth herein therefore does not address these terms.

(a) The Parties' Positions

Plaintiff argues that "[t]he plain language of the claims shows that interleaving and encoding functionality is part of the transmitter portion and that deinterleaving and decoding functionality is part of the receiving portion," and "[t]he specification matches the claims." (Dkt. No. 124, at 26.)

Defendants respond that these terms are not reasonably clear "because interleaving and deinterleaving functionalities do not actually transmit or receive data; rather, the transmitter transmits and the receiver receives data using hardware components, such as digital-to-analog or analog-to-digital converters, amplifiers, and antennas." (Dkt. No. 135, at 25.) For example, Defendants submit: "Prior to being transmitted, data can be interleaved by an interleaver to spread out the symbols of each codeword. The data, however, is not transmitted using the interleaver functionality." (*Id.*) Defendants argue that "[t]h[e] claims and specification excerpts [cited by Plaintiff] merely repeat the illogical proposition of transmitting/receiving using an interleaver/deinterleaver, which, as discussed above, does not sufficiently inform a POSITA about the scope of the term." (*Id.*, at 26.)

Plaintiff replies that Defendants' indefiniteness challenge lacks merit because "[i]t is undisputed that the Patents disclose that the transmitter performs interleaving and coding and,

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conversely, the receiver performs deinterleaving and decoding." (Dkt. No. 140, at 9 (citing '348 Patent at 9:41–49).)

(b) Analysis

The claims here at issue involve transmitters and receivers, and the specification discloses for example:

> [W]hile some of the exemplary embodiments described herein are directed toward a transmitter portion of a transceiver performing interleaving and/or coding on transmitted information, it should be appreciated that a corresponding deinterleaving and/or decoding is performed by a receiving portion of a transceiver. Thus, while perhaps not specifically illustrated in every example, this disclosure is intended to include this corresponding functionality in both the same transceiver and/or another transceiver.

'348 Patent at 9:41–49.

> Claim 1 of the '348 Patent, for example, recites (emphasis added):
>
> 1. An apparatus comprising:
>   a multicarrier transceiver including a processor and memory operable to:
>   transmit a packet using a forward error correction encoder and an interleaver, wherein the packet comprises a header field and a plurality of PTM-TC codewords, a plurality of ATM cells or a plurality of Reed-Solomon codewords, and wherein the header field comprises a sequence identifier (SID); and
>   *receive a plurality of messages using a forward error correction decoder and without using a deinterleaver*, wherein each message of the plurality of messages is received in a different DMT symbol and wherein at least one message of the plurality of messages includes an acknowledgement (ACK) or a negative acknowledgement (NACK) of the transmitted packet.
>
> * * *
>
> 3. The apparatus of claim 1, wherein the transceiver is operable to retransmit the packet using the forward error correction encoder and the interleaver.

These claims expressly recite a "transceiver" that transmits and receives, and the recitals of using or not using an "interleaver" or a "deinterleaver" do not give rise to any lack of reasonable certainty regarding the scope of these claims. The other claims here at issue are

similar in this regard. Defendants argue that these claims are unclear because "interleaving and deinterleaving functionalities do not actually transmit or receive data." (Dkt. No. 135, at 25.) For example, Defendants argue that interleaving occurs *before* transmitting. Plaintiff's expert persuasively opines, however, that "[t]hese terms quite simply specify that functionality of a transceiver (transmitting, for example) is performed using a specified sub-function or sub-element of the transceiver (interleaving, for example)." (Dkt. No. 124, Ex. 12, Mar. 15, 2022 Cooklev Decl., at ¶¶ 146.) To whatever extent the opinions set forth in the declaration of Defendants' expert can be read as stating otherwise, those opinions of Defendants' expert are unpersuasive. (*See* Dkt. No. 135, Ex. 25, Mar. 14, 2022 Wesel Decl., at ¶¶ 50–56.)

The Court therefore hereby expressly rejects Defendants' indefiniteness arguments as to these disputed terms, and Defendants present no alternative proposed constructions.

The Court accordingly hereby construes these disputed terms to have their **plain meaning**.

XI. DISPUTED TERMS IN THE "FAMILY 10" PATENTS

Plaintiff submits that "the Family 10 Patents generally relate to assigning different signal-to-noise ('SNR') margins to different carriers to address the tradeoff between channel robustness and the available data rate." (Dkt. No. 124, at 1 (citation omitted).)

The '354 Patent, titled "Systems and Methods for a Multicarrier Modulation System with a Variable Margin," issued on October 6, 2015, and bears an earliest priority date of April 18, 2000. The Abstract of the '354 Patent states:

> A multicarrier modem has a plurality of carriers over which data is transmitted. By assigning, for example, one or more different margins to the individual carriers the data rate and impairment immunity can be increased.

33. "a multicarrier communications transceiver operable to: receive a multicarrier symbol comprising a first plurality of carriers"

"a multicarrier communications transceiver operable to: receive a multicarrier symbol comprising a first plurality of carriers" '354 Patent, Claim 10	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary.	Indefinite

(Dkt. No. 107, Ex. A, at 108; *id.*, Ex. B, at 17; Dkt. No. 146, App'x A, at 10–11; Dkt. No. 149, App'x A, at 70.)

(a) The Parties' Positions

Plaintiff argues that "[t]he specification teaches how multicarrier modulation is used to transmit bits using multiple carriers," and "[o]ne of ordinary skill would have understood that [*sic*] a multicarrier symbol that comprises a first plurality of carriers to refer to that multicarrier signal, viewed as the collection of bit st[r]eams from a digital perspective (e.g., the collection of bits on each carrier)." (Dkt. No. 124, at 27 (citations omitted).)

Defendants respond: "A multicarrier symbol in the context of a discrete multitone modulation system is the sum of the full collection of carriers modulated by the system. The intrinsic record of the '354 Patent fails to inform a POSITA how a multicarrier symbol is subdivided into different subsets of carriers." (Dkt. No. 135, at 27–28 (citation and internal quotation marks omitted).)

Plaintiff replies that Defendants' argument "is not a definiteness argument (which is about understanding the scope of the claims); it is an incorrect written description or enablement argument." (Dkt. No. 140, at 10.)

(b) Analysis

Claim 10 of the '354 Patent (as corrected by two Certificates of Correction, *see* Dkt.

No. 124, Ex. 10, at pp. 11–12 of 12) recites (emphasis added):

> 10. *A multicarrier communications transceiver operable to:*
>   *receive a multicarrier symbol comprising a first plurality of carriers* and a
> second plurality of carriers;
>   receive a first plurality of bits on the first plurality of carriers using a first
> SNR margin;
>   receive a second plurality of bits on the second plurality of carriers using a
> second SNR margin;
>   wherein the first plurality of carriers is different than the second plurality
> of carriers,
>   wherein the first SNR margin is different than the second SNR margin,
> and
>   wherein the first SNR margin provides more robust reception than the
> second SNR margin.

Defendants argue that "[t]he intrinsic record of the '354 Patent fails to inform a POSITA

how a multicarrier symbol is subdivided into different subsets of carriers." (Dkt. No. 135, at 28.)

Plaintiff's expert opines that a "multicarrier symbol" is conveyed by a multicarrier signal,

which can be "viewed as the collection of bit st[r]eams from a digital perspective (*e.g.*, the

collection of bits on each carrier)." (Dkt. No. 124, Ex. 12, Mar. 15, 2022 Cooklev Decl.,

at ¶ 151.)

The specification supports this understanding by disclosing that carriers are used

"collectively" to convey data:

> Multicarrier modulation, or Discrete Multitone Modulation (DMT), is a
> transmission method that is widely used for communication over difficult media.
> Multicarrier modulation divides the transmission frequency band into multiple
> subchannels, i.e., carriers or bins, with each carrier individually modulating a bit
> or a collection of bits. A transmitter modulates an input data stream containing
> information bits with one or more carriers, i.e., bins or subchannels, and transmits
> the modulated information. A receiver demodulates all the carriers in order to
> recover the transmitted information bits as an output data stream.
>
>   * * *

> Individually, the carriers form discrete, non-overlapping communication subchannels which are of a limited bandwidth. Collectively, the carriers form what is effectively a broadband communications channel. At the receiver end, the carriers are demodulated and the data recovered.

'354 Patent at 1:32–43 & 3:8–13; *see also id.* at Abstract ("A multicarrier modem has a plurality of carriers over which data is transmitted.").

This understanding is also consistent with the context in which the disputed term appears in the claim (reproduced above), wherein a "multicarrier symbol" conveys "a first plurality of bits on the first plurality of carriers" and "a second plurality of bits on the second plurality of carriers." Thus, "multicarrier symbol" can be understood as conveying bits by using multiple carriers. This is by no means the only requirement set forth by the claim, but the Court rejects Defendants' argument that this requirement is not reasonably clear in the context of the claim and the specification.

The opinions of Defendants' expert are likewise unpersuasive. (*See* Dkt. No. 135, Ex. 24, Mar. 14, 2022 Zimmerman Decl. at ¶¶ 83–86.) Defendants' expert opines:

> The specification of the '354 Patent does not disclose or define a "multicarrier symbol." The specification shows that the alleged invention relates to a discrete multitone modulation system. *See, e.g.*, '354 Patent at 1:30–2:45, 4:14–16 ("In an exemplary embodiment of the invention, the margin is set to be different on at least two subchannels in a discrete multitone modulation system."). Therefore, in this context, a person of ordinary skill in the art would understand a "multicarrier symbol" to refer to a symbol used in a discrete multitone modulation system, which is the sum of the full collection of carriers modulated by the system. It is unclear to a person of ordinary skill in the art how a multicarrier symbol is subdivided into a first and a second plurality of carriers. Furthermore, it is unclear to a person of ordinary skill in the art how a multicarrier symbol could comprise a subset of carriers from the full collection such that there could be a first plurality of carriers and a second plurality of carriers.

(*Id.* at ¶ 84.) Defendants' expert thus agrees that "a person of ordinary skill in the art would understand a 'multicarrier symbol' to refer to a symbol used in a discrete multitone modulation

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system, which is the sum of the full collection of carriers modulated by the system." (*Id.*) The

opinions that "[i]t is unclear to a person of ordinary skill in the art how a multicarrier symbol is

subdivided into a first and a second plurality of carriers" and "it is unclear to a person of ordinary

skill in the art how a multicarrier symbol could comprise a subset of carriers from the full

collection such that there could be a first plurality of carriers and a second plurality of carriers"

(*id.*) do not demonstrate indefiniteness but rather perhaps may bear upon enablement or written

description requirements, which are not at issue in the present claim construction proceedings.

See Phillips, 415 F.3d at 1327 ("we have certainly not endorsed a regime in which validity

analysis is a regular component of claim construction") (citation omitted).

The Court therefore hereby expressly rejects Defendants' indefiniteness argument as to

this disputed term. Defendants present no alternative proposed construction, and no further

construction is necessary.

The Court accordingly hereby construes **"a multicarrier communications transceiver**

operable to: receive a multicarrier symbol comprising a first plurality of carriers" to have

its **plain meaning**.

34. "receive a first plurality of bits on the first plurality of carriers using a first SNR margin; receive a second plurality of bits on the second plurality of carriers using a second SNR margin"

"receive a first plurality of bits on the first plurality of carriers using a first SNR margin; receive a second plurality of bits on the second plurality of carriers using a second SNR margin" '354 Patent, Claim 10	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary.	Indefinite

(Dkt. No. 107, Ex. A, at 108; *id.*, Ex. B, at 17; Dkt. No. 146, App'x A, at 11; Dkt. No. 149, App'x A, at 71.)

(a) The Parties' Positions

Plaintiff argues that "[t]he Patent explains that the SNR margin is used to determine the number of bits to allocate to each carrier," "[t]he margin is set on each carrier," and "[t]hus, receiving bits on carriers 'using a [first/second] SNR margin' is reasonably understood to mean that the claimed multicarrier transceiver is operable to receive bits on a carriers [*sic*] where an SNR margin is used for performing bit loading on the carriers." (Dkt. No. 124, at 28 (citations omitted).)

Defendants respond that "the language of claim 10 of the '354 Patent is directed to receiving information bits," and "[b]y contrast, bit loading is performed with the *transmitter* portion of the transceiver—not the receiver portion." (Dkt. No. 135, at 28 (emphasis added).) "Therefore," Defendants argue, "it is unclear to a POSITA how the transceiver is operable to *receive* a [first/second] plurality of bits *using* an SNR margin." (*Id.*) Further, Defendants argue, "assigning different SNR margins, as described in the '354 Patent specification and discussed in TQ Delta's opening brief, fails to describe *how* the SNR Margin is used to 'receive' a [first/second] plurality of bits." (*Id.*, at 28–29 (citations omitted).)

Plaintiff replies that "the Patents explain that . . . the language refers to receiving bits on carriers where an SNR margin was used to perform bit loading . . . ." (Dkt. No. 140, at 10 (citing Dkt. No. 124, at 28–29).) Plaintiff argues that Defendants' argument "is a misplaced written description or enablement argument, not a definiteness challenge." (*Id.*)

(b) Analysis

Claim 10 of the '354 Patent (as corrected by two Certificates of Correction, *see* Dkt.

No. 124, Ex. 10, at pp. 11–12 of 12) recites (emphasis added):

> 10. A multicarrier communications transceiver operable to:
>   receive a multicarrier symbol comprising a first plurality of carriers and a second plurality of carriers;
>   *receive a first plurality of bits on the first plurality of carriers using a first SNR margin;*
>   *receive a second plurality of bits on the second plurality of carriers using a second SNR margin*;
>   wherein the first plurality of carriers is different than the second plurality of carriers,
>   wherein the first SNR margin is different than the second SNR margin, and
>   wherein the first SNR margin provides more robust reception than the second SNR margin.

Defendants argue that this disputed term is unclear because whereas these claim

limitations are directed to *receiving* a communication, "using" an SNR margin occurs when

transmitting. Defendants' expert opines:

> During initialization of the discrete multitone modulation system, the signal-to-noise ratios of each subchannel is calculated by the system by sending signals between the transmitter and receiver. Then, the system calculates the number of bits that can be transmitted on each subchannel, in part, by using the calculated signal-to-noise ratios of each subchannel. A person of ordinary skill in the art would not understand how the transmitter could "receive a [first/second] plurality of bits . . . using a [first/second] SNR margin" when the SNR margin is used by the transmitter during initialization to determine the number of bits to transmit on each subchannel. Nor could a person of ordinary skill in the art understand how the SNR margin, as assigned to the plurality of carriers, is used to "receive a [first/second] plurality of bits." Based on the '354 Patent specification, a person of skill in the art would understand that the SNR margin is assigned to the plurality of carriers based on impairments of or on a carrier, such as insertion loss of the wire or medium itself, or based on a known impairment on a carrier. *See* '354 Patent at 2:14–19; 5:3–6; 7:29–36. Accordingly, the SNR margin is not used to receive a plurality of bits.

(*See* Dkt. No. 135, Ex. 24, Mar. 14, 2022 Zimmerman Decl. at ¶ 89.)

A fair reading of the claim language, however, is that the "receive . . ." limitations refer to receiving a transmission *from* a transmitter that is operable to transmit, for example, a first plurality of bits on the first plurality of carriers using a first SNR margin. This understanding is consistent with disclosures in the specification, such as disclosure regarding signal-to-noise ratio ("SNR") margins specifying an amount of "extra" SNR for a transmission:

> Discrete multitone modulation transceivers modulate a number of bits on each subchannel, the number of bits depending on the Signal to Noise Ratio (SNR) of that sub channel and the Bit Error Rate (BER) requirement of a link. For example, if the required BER is 1×10^{-7}, i.e., one bit in ten million is received in error on average, and the SNR of a particular subchannel is 21.5 dB, then that subchannel can modulate 4 bits, since 21.5 dB is the required SNR to transmit 4 QAM bits with a 1×10^{-7} BER. Other subchannels can have a different SNR and therefore may have a different number of bits allocated to them at the same BER. Additional information regarding bit loading can be found in copending U.S. application Ser. No. 09/510,773, incorporated herein by reference in its entirety.

> In many DMT systems, an additional parameter is used to determine the number of bits allocated to each subchannel. This parameter is called the ["]SNR []margin," or simply the "margin." The margin specifies an extra SNR per subchannel, in addition to what is required to maintain the specified BER requirement. As an example, a DMT system with a 6 dB margin would require a 21.5+6=27.5 dB SNR on a subchannel in order to transmit 4 bits on that subchannel with a 1×10^{-7} BER. This is 6 dB more than required by the example in the previous paragraph because now a 6 dB margin is added to the system. Another way of looking at this is that in the example of the previous paragraph, where 4 bits were allocated to a subchannel with 21.5 dB SNR, the margin was 0 dB.

> * * *

> In an exemplary embodiment of the invention, the margin is set to be different on at least two subchannels in a discrete multitone modulation system. In this exemplary embodiment, subchannels which are expected to incur greater variations in impairment levels are set to have a higher margin, whereas subchannels which are expected to incur lower variations in impairment levels are set to have lower margins.

'354 Patent at 1:57–2:17 & 4:14–20.

Particularly when reading the claim language in light of this disclosure in the specification, the limitation of "receive a first plurality of bits on the first plurality of carriers using a first SNR margin," for example, is readily understood not as referring to using the SNR margin to receive the bits, as Defendants suggest, but rather as referring to receiving carriers that were transmitted using a particular SNR margin.

The Court therefore hereby expressly rejects Defendants' indefiniteness argument as to this disputed term, and Defendants present no alternative proposed construction.

The Court accordingly hereby construes **"receive a first plurality of bits on the first plurality of carriers using a first SNR margin; receive a second plurality of bits on the second plurality of carriers using a second SNR margin"** to have its **plain meaning**.

35. "wherein the first SNR margin provides more robust reception than the second SNR margin"

"wherein the first SNR margin provides more robust reception than the second SNR margin" '354 Patent, Claim 10	
Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Plain and ordinary meaning. No construction necessary.	Indefinite

(Dkt. No. 107, Ex. A, at 109; *id.*, Ex. B, at 17; Dkt. No. 146, App'x A, at 11; Dkt. No. 149, App'x A, at 72.)

(a) The Parties' Positions

Plaintiff argues that "[t]he Patent describes 'robustness' in the context of the SNR margin for a channel as allowing the system to maintain a required bit error rate," and "[t]hus, one of ordinary skill would have understood that the first signal-to-noise ('SNR') margin provides more

robust reception than the second SNR margin by, for example, reducing the bit error rate (e.g.,

making it less likely that a transmission would be subject to significant errors, which makes the

reception more 'robust,' e.g., less likely to require error correction or retransmission)." (Dkt.

No. 124, at 29 (citations omitted).)

Defendants respond: "TQ Delta and its own expert acknowledge that the '354 Patent

specification describes robustness only as a measurement of the overall system. Not only does

the specification fail to describe *how* an SNR margin (at the carrier level) provides more robust

reception at the system level, but it also fails to describe how the SNR Margin, as opposed to

other known factors, *provides* more robust reception." (Dkt. No. 135, at 29 (citations omitted).)

Plaintiff replies that "robustness refers to maintaining a required bit-error rate." (Dkt.

No. 140, at 10 (citing Dkt. No. 124, at 28–29).) Plaintiff argues that Defendants' argument "is a

misplaced written description or enablement argument, not a definiteness challenge." (*Id.*)

(b) Analysis

Claim 10 of the '354 Patent (as corrected by two Certificates of Correction, *see* Dkt.

No. 124, Ex. 10, at pp. 11–12 of 12) recites (emphasis added):

> 10. A multicarrier communications transceiver operable to:
>   receive a multicarrier symbol comprising a first plurality of carriers and a
> second plurality of carriers;
>   receive a first plurality of bits on the first plurality of carriers using a first
> SNR margin;
>   receive a second plurality of bits on the second plurality of carriers using a
> second SNR margin;
>   wherein the first plurality of carriers is different than the second plurality
> of carriers,
>   wherein the first SNR margin is different than the second SNR margin,
> and
>   *wherein the first SNR margin provides more robust reception than the
> second SNR margin.*

Defendants' expert opines that this disputed term is unclear because "[t]he specification refers to robustness as a tradeoff with data rate for the whole system, not individual carriers." (Dkt. No. 135, Ex. 24, Mar. 14, 2022 Zimmerman Decl. at ¶ 93 (citing '354 Patent at 2:17–33 (reproduced below)).) "Moreover," Defendants' expert opines, "'robustness' of a signal can be measured in a number of different ways," and "[t]he specification lists some of these as advantages of multicarrier modulation, for example, 'a higher immunity to impulse noise, a lower complexity equalization requirement in the presence of multipath, a higher immunity to narrow band interference, a higher data rate and bandwidth flexibility.'" (*Id.*, at ¶ 94 (citing '354 Patent at 1:45–49).)

> The specification provides context for the recital of "robust" by disclosing:
>
> DMT transceivers use a margin to increase the system's immunity to various types of time varying impairments. Examples of these impairments in DSL systems are: changes in the levels of crosstalk from other transmission systems, impulse noise, temperature changes in the telephone line, or the like. When a DMT system is operating with a positive SNR margin, the noise can change instantaneously by the level of the margin and the system will still maintain the required BER. For example, if the system is operating at a 6 dB margin, e.g., 4 bits are allocated to carriers with 27.5 dB SNR for BER=$1x10^{-7}$, the crosstalk levels can increase by 6 dB and the system will still be operating at the required $1x10^{-7}$ BER. Obviously the penalty for this *increase in robustness* is a decrease in the data rate, since with a 0 dB margin, a subchannel with 27.5 dB SNR can modulate 6 bits at $1x10^{-7}$ BER.
>
> Therefore, there is a tradeoff between the *robustness* of the channel. Such as a phone line, and the achievable data rate. The margin can be used to quantify this tradeoff. A *higher margin* results in a higher level of immunity to changing channel conditions at the expense of the achievable data rate. Likewise, a lower margin results in a higher data rate at the expense of a lower immunity to changing channel conditions.

'354 Patent at 2:18–40 (emphasis added); *see id.* at 3:34–51 (similar).

This disclosure regarding using increased SNR to achieve an "increase in robustness" provides context for understanding that "the first SNR margin provides more robust reception

than the second SNR margin" by the first SNR margin being greater in magnitude than the

second SNR margin. *See id.* at 2:18–40. Although perhaps this is not the only way to increase

"robustness," the claim here at issue expressly refers to using SNR margin, and the specification

explains that a greater SNR margin provides increased robustness. *See id.*

The Court therefore hereby construes **"wherein the first SNR margin provides more**

robust reception than the second SNR margin" to mean **"wherein the first SNR margin is**

greater than the second SNR margin."

36. "signal to noise ratio (SNR) margin" and "SNR margin"

<table>
<tr><td colspan="2" align="center">**"signal to noise ratio (SNR) margin"**
"SNR margin"
'988 Patent, Claim 16
'354 Patent, Claim 10</td></tr>
<tr><td>**Plaintiff's Proposed Construction**</td><td>**Defendants' Proposed Construction**</td></tr>
<tr><td>Plain and ordinary meaning. No construction necessary.</td><td>"a parameter used in determining the number of bits allocated to each of a plurality of carriers, where the value of the parameter specifies an extra SNR requirement assigned per carrier in addition to the SNR required to maintain a specified bit error rate (BER) for the communication link at a specified bit allocation"</td></tr>
</table>

(Dkt. No. 107, Ex. A, at 110; *id.*, Ex. B, at 18; Dkt. No. 146, App'x A, at 11; Dkt. No. 149,

App'x A, at 73.)

(a) The Parties' Positions

Plaintiff argues that "SNR margin is an established term to those of skill in the art,

referencing 'an additional parameter' in multicarrier systems that is 'used to determine the

number of bits allocated to each subchannel.'" (Dkt. No. 124, at 30 (quoting '354 Patent at 2:4–

5).)   Plaintiff also urges that "[w]hile [in prior litigation] TQ Delta agreed to the same construction proposed by Defendants' here," "TQ Delta submits that Defendants' proposed construction is unlikely to assist the jury to resolve any fact issues any more than the simpler term 'SNR margin' (which, again, is an established term in the multicarrier communications art)." (*Id.* (citation omitted).)

Defendants respond that "Defendants' proposal finds direct support in the shared specification of the '354 and '988 Patents (*see* '354 Patent at 2:4–9), and TQ Delta previously agreed to the same construction in the ADTRAN Case." (Dkt. No. 135, at 30 (citation omitted).)

Plaintiff replies: "Defendants fail to identify any claim-scope issue. There is no need to construe this term." (Dkt. No. 140, at 10.)

(b) Analysis

Defendants propose a construction that Plaintiff agreed to in the District of Delaware as to United States Patent No. 8,625,660 ("the '660 Patent"), which is a "grandparent" of the '354 Patent. Specifically, the '354 Patent resulted from a continuation of a continuation of the '660 Patent. The District of Delaware adopted an agreement reached between the parties in that case to construe "signal to noise ratio (SNR) margin" to mean "a parameter used in determining the number of bits allocated to each of a plurality of carriers, where the value of the parameter specifies an extra SNR requirement assigned per carrier in addition to the SNR required to maintain a specified bit error rate (BER) for the communication link at a specified bit allocation." *TQ Delta, LLC v. ADTRAN, Inc.*, No. 1:14-CV-00954-RGA, Dkt. No. 375, slip op. at 5 (D. Del. Apr. 27, 2018).

This construction that was agreed upon as to the related '660 Patent in the District of Delaware is consistent with disclosure in the specification:

> In many DMT [(Discrete Multitone Modulation)] systems, an additional parameter is used to determine the number of bits allocated to each subchannel. This parameter is called the SNR "margin," or simply the "margin." The margin specifies an extra SNR per subchannel, in addition to what is required to maintain the specified BER [(Bit Error Rate)] requirement.

'354 Patent at 2:4–9. The construction agreed upon in the District of Delaware is supported by this disclosure, and "some construction of the disputed claim language will assist the jury to understand the claims." *TQP Dev., LLC v. Merrill Lynch & Co.*, No. 2:08-CV-471, 2012 WL 1940849, at *2 (E.D. Tex. May 29, 2012) (Bryson, J., sitting by designation).

Finally, Plaintiff does not substantively oppose Defendants' proposal of the construction that Plaintiff agreed upon in the District of Delaware as to the related '660 Patent. Instead, Plaintiff states that "SNR margin is an established term to those of skill in the art, referencing 'an additional parameter' in multicarrier systems that is 'used to determine the number of bits allocated to each subchannel,' and "[i]t is unclear if there is a claim-scope dispute between the parties for these terms." (Dkt. No. 124, at 30 (quoting '354 Patent at 2:4–9).)

The Court therefore adopts the construction agreed upon in the District of Delaware. This comports with the general principle that "[w]here multiple patents 'derive from the same parent application and share many common terms, we must interpret the claims consistently across all asserted patents.'" *SightSound Techs., LLC v. Apple Inc.*, 809 F.3d 1307, 1316 (Fed. Cir. 2015) (quoting *NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1293 (Fed. Cir. 2005), and applying the same construction for a claim term appearing in the claims of multiple related patents). Also, the claims at issue in the present case, like the claims at issue in the construction by the District of Delaware in a related patent, use SNR margin in the context of pluralities of bits and pluralities of carriers. *See* '988 Patent, Cl. 16; *see also* '354 Patent, Cl. 10. Because this

Court adopts the Delaware construction, the Court need not reach Defendants' argument that Plaintiff is estopped from proposing a different construction.

The Court accordingly hereby construes **"Signal to Noise Ratio (SNR) margin"** to mean **"a parameter used in determining the number of bits allocated to each of a plurality of carriers, where the value of the parameter specifies an extra SNR requirement assigned per carrier in addition to the SNR required to maintain a specified bit error rate (BER) for the communication link at a specified bit allocation."**

XII. CONCLUSION

The Court adopts the constructions set forth in this opinion for the disputed terms of the patents-in-suit.

The parties are ordered that they may not refer, directly or indirectly, to each other's claim construction positions in the presence of the jury. Likewise, the parties are ordered to refrain from mentioning any portion of this opinion, other than the actual definitions adopted by the Court, in the presence of the jury. Any reference to claim construction proceedings is limited to informing the jury of the definitions adopted by the Court.

So ORDERED and SIGNED this 8th day of June, 2022.

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RODNEY GILSTRAP
UNITED STATES DISTRICT JUDGE